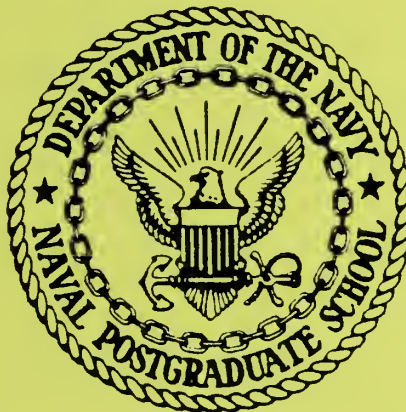


NPS52-80-012

# NAVAL POSTGRADUATE SCHOOL

Monterey, California



Baseline Implementations of the  
Standard Line Editor (SLED)

L. Cox, R. Coulter,  
C. Taylor, R. Burnham, and S. Smart

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) In response to a recognized requirement for a more uniform man machine interface, especially in multiple machine networks, a standardized text editor was proposed (1). This editor, "SLED" was designed to be easily implementable in several commonly available higher level languages. This document reviews two baseline implementations taken directly from the SLED standards which users may want to consider when implementing SLED upon local systems. These baseline programs were written and documented with portability and understandability as goals.		

Baseline Implementations of the  
Standard Line Editor (SLED)

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Editor

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Monterey, California

ABSTRACT

In response to a recognized requirement for a more uniform man machine interface, especially in multiple machine networks, a standardized text editor was proposed (1). This editor, "SLED" was designed to be easily implementable in several commonly available higher level languages. This document reviews two baseline implementations taken directly from the SLED standards which users may want to consider when implementing SLED upon local systems. These baseline programs were written and documented with portability and understandability as goals.

BACKGROUND

During the Winter of 1979 and Spring of 1980, shortly after the Standard Line Editor definition was first developed, several persons at the Naval Postgraduate School undertook implementations of SLED. Two of these implementations -- the documentation and the code -- are reproduced here.

Appendix A contains the SLED implementation developed by C. F. Taylor, Jr. on an IBM 360 system in FORTRAN. Appendix B contains an alternate implementation developed by R. M. Burnham, R. J. Coulter, and S. W. Smart in the PASCAL language.

Neither of these implementations should be considered "off the shelf" commercial quality software ready for installation. These systems do however provide two critical portions of the implementation:

1. Each contains the basic code in a "portable" higher level language, and

2. The code of each implementation is written for readability.

and the documentation has been written to allow the program to be adapted to any system with a minimum of difficulty.

It is hoped that these baseline programs will serve to facilitate the implementation of the SLED man machine interface on a variety of machines.

Acknowledgments:

I would like to thank the authors of the included codes, C. Taylor, R. Burnham, R. Coulter, and S. Smart for their particularly outstanding work on this project. I would also like to acknowledge the assistance of many of their contemporaries who attempted alternative implementations, and who helped in the evolution of the SLED standards. I would also like to thank Dr. R. W. Hamming and LTCOL. R. R. Schell for their comments and interest.

Lyle A. Cox Jr.  
15 August, 1980

(1) "The Text Editor As A Uniform Man/Machine Interface. A Proposal for a Standard Editor." L. A. Cox Jr., Naval Postgraduate School Report NPS52-80-001 (Feb. 1980).

Appendix A  
SLED FORTRAN Implementation  
(by C. F. Taylor Jr.)

The purpose of these notes is to briefly describe the accompanying FORTRAN implementation of SLED.

SLED FORTRAN Version FORT1.1 was implemented on an IBM 360/67 computer under the CP/CMS time-sharing operating system at the W. R. Church Computer Center at the Naval Postgraduate School, in a superset of IBM FORTRAN IV, Level G, which included the "IF-THEN-ELSE" and "WHILE-DO" constructs of WATFIV-S. The addition of these two constructs greatly simplified the writing of the program and were implemented with the aid of a preprocessor written by this author. Standard FORTRAN version (the output of the preprocessor) is shown on the following pages.

This version was compiled using an IBM FORTRAN IV/G compiler.

The package was implemented using the utility routines shown on pages A37-A40 of the listings. The 'TDISK EXEC' module was used to obtain the required disk space for the 4000 line (320K byte) temporary work file. It is assumed that this work space would be provided at the system level in any actual implementation of SLED. Because it is a direct-access disk file, sufficient space must be available in advance for the maximum capacity of the editor, which in this case is 4000 lines. This figure was selected somewhat arbitrarily; CP/CMS gives the user 800 bytes per track (IBM 2314), using the remaining space for overhead, so at 80 bytes per line, 4000 lines represents 400 tracks. Installations which do not need to edit such large files could reduce disk requirements by further limiting the capacity of the editor as follows:

1. Do a global substitution to replace the string '4000' in the program by the new capacity.
2. Modify the 'DEFINE FILE' statement in subroutine MEMORY as necessary.
3. Alter the FILEDEF statement in 'SLED1 EXEC' (or the equivalent action on another system) to request less disk space.

The basic data structures used are as follows: The file to be edited (unless a new file is being established) is read in sequentially by subroutine OPEN and stored in the work file (described above) which is conceptually a 4000 line by 80 column array. All references to the work file are made through calls to subroutine MEMORY. The lines of the work file are not necessarily kept in order. A 4000 element from the file is determined by popping the top element from the stack. This value is then recorded in the 4000 element array LPTR. LPTR(I) then always gives the address in the work file of the Ith line of the text file. As lines are deleted, their addresses are pushed back onto

additions and deletions of lines by manipulating pointers rather than the text itself. Still, the work file may be accessed sequentially by using LPTR(I) as the index.

Input from the terminal is buffered in a circular queue in subroutine GETLIN. This permits the "stacking" of more than one command per line at the terminal. Calls to GETLIN return a line from the head of the queue or, if the queue is empty it reads in a new line from the terminal.

The QUIT subroutine writes the work file sequentially (using LPTR as an index) to the output file.

Additional notes which may be of interest to the local implementor follow: (including deviations from the SLED standard).

1. Integer\*2 variables were used for all character storage (and for the two large arrays STACK and LPTR). Only one character was stored per word.

2. Because FORTRAN reads only fixed-length formatted records from the terminal, the carriage return cannot be used to terminate a string. This means that 'DS' and 'RS' commands must use the logical terminator character (default '\$') to terminate strings and that the 'RS' command should be used as follows: RS\$str1\$str2\$.

3. The 'RS' command replaces only the first occurrence of a string in a line because of this author's firm conviction that to allow only multiple substitution would be dangerous. In an editor such as this without a TAB function, a common string substitution would be to replace one blank with two blanks on a line. What would happen if this were done for every occurrence of a blank on the line is too horrible to contemplate.

4. The CP/CMS operating system and IBM FORTRAN required that filenames be handled external to the program itself. The routine 'SLED EXEC' executes the simple program 'SLEDVERS' when 'SLED' is typed to alert the user to the required entry procedure, 'SLED1 <filename> <file-type>'. SLED1 EXEC then invokes the actual edit program, SLED2. The filename given the program internally is meaningless and provided only for cosmetic reasons. This system requires that only one file be opened per session.

5. Another limitation of FORTRAN required that the program read input from the line following the program prompt, not a serious problem.

## SLED - STRUCTURED FORTRAN



10/02/80 12.20.49

FILE: SLED FORTRAN T1 NAVAL POSTGRADUATE SCHOOL

C STANDARD LINE EDITOR--FORTRAN IMPLEMENTATION

C SLED VERSION FORTL.1 NPS MONTEREY 900401  
C PROGRAMMED BY: C. F. TAYLOR, JR., CODE 55TA

C FOR FURTHER INFORMATION SEE NPS TECHNICAL REPORT  
C NPS 52-80-001 BY L. A. COX, JR.

C MAIN PROGRAM:

C READS IN COMMANDS AND CALLS THE APPROPRIATE SUBROUTINE  
C IMPLEMENTS THE "EDIT" MODE

C  
C COMMON /BLK1/IN,OUT  
1 /BLK5/MFLAG,ERRCT,CURLIN  
1 INTEGER\*2 C1,C2,A,C,D,L,M,O,Q,R,S,T,V,INLINE,BLNK  
1 INTEGER IN,OUT,ERRCT,CURLIN,NC  
1 DIMENSION INLINE(80)  
1 LOGICAL FLAG,OPENFL,MFLAG  
1 DATA A/'A'/,C/'C'/,D/'D'/,L/'L'/,M/'M'/,O/'O'/,Q/'Q'/,R/'R'/,  
1 S/'S'/,T/'T'/,V/'V'/,BLNK/' '/  
2000 FORMAT (' E>')  
2010 FORMAT (' -INVALID COMMAND- ',2A1)  
2020 FORMAT (' -NO TEXT FILE OPEN-')  
2030 FORMAT (' -ONLY ONE FILE CAN BE OPENED PER SESSION IN THIS ',  
1 'VERSION OF SLED-')  
C EDIT MODE--WRITE PROMPT  
C WRITE (OUT,2000)  
C CALL GETLIN(INLINE,NC)  
C C1 = INLINE(1)  
C C2 = INLINE(2)  
C FLAG GOES FALSE AFTER 'QUIT'  
C FLAG = .TRUE.  
C OPENFL GOES TRUE AFTER FILE IS OPENED  
C OPENFL = .FALSE.  
C MAIN EDIT LOOP  
C WHILE (FLAG) DO  
1 IF (.NOT.(OPENFL .OR. (C1.EQ.O) .OR. (C1.EQ.M)  
1 .OR. (C1.EQ.V))) THEN DO  
C FILE NOT OPEN AND THIS IS NOT AN 'OPEN' COMMAND  
C OR A 'MENU' OR 'VERSION' REQUEST  
C WRITE (OUT,2020)  
C ELSE DO  
C EMULATE CASE (SWITCH) STATEMENT TO PROCESS COMMANDS  
C IF (C1.EQ. BLNK) GO TO 200  
C IF (C1.NE.L) GO TO 10  
C CALL LIST(INLINE)  
C GO TO 200  
10 CONTINUE  
C IF (C1.NE.S) GO TO 20  
C CALL SCREEN(INLINE)  
C GO TO 200  
20 CONTINUE  
C IF ((C1.NE.R).OR.(C2.NE.S)) GO TO 30

```

      CALL RS(INLINE)
      GO TO 200
30    CONTINUE
      IF ((C1.NE.R).OR.(C2.NE.L)) GO TO 40
      CALL RL(INLINE)
      GO TO 200
40    CONTINUE
      IF ((C1.NE.A).OR.(C2.NE.L)) GO TO 50
      CALL AL(INLINE)
      GO TO 200
50    CONTINUE
      IF ((C1.NE.D).OR.(C2.NE.S)) GO TO 60
      CALL DS(INLINE)
      GO TO 200
60    CONTINUE
      IF (C1.NE.Q) GO TO 70
      CALL QUIT
      FLAG = .FALSE.
      GO TO 200
70    CONTINUE
      IF (C1.NE.V) GO TO 80
      CALL VERS
      GO TO 200
80    CONTINUE
      IF (C1.NE.M) GO TO 90
      CALL MENU
      GO TO 200
90    CONTINUE
      IF (C1.NE.O) GO TO 100
      IF (OPENFL) THEN DO
          WRITE (OUT,203Q)
      ELSE DO
          CALL OPEN
          OPENFL = .TRUE.
      END IF
      GO TO 200
100   CONTINUE
      IF ((C1.NE.C).OR.(C2.NE.T)) GO TO 110
      CALL CT(INLINE)
      GO TO 200
110   CONTINUE
C     IF PROGRAM GETS HERE, COMMAND IS INVALID
C     WRITE (OUT,2010) C1,C2
      ERRCT = ERRCT + 1
C     END CASE
200   CONTINUE
      IF (ERRCT.GE.2) THEN DO
          CALL MENU
          ERRCT = 0
      END IF
END IF
C     IF (FLAG) THEN DO
      GET NEXT LINE
      IF (.NOT.MFLAG) WRITE (OUT,2000)

```

```

                CALL GETLIN(INLINE,NC)
                C1 = INLINE(1)
                C2 = INLINE(2)
            END IF
        END WHILE
    STOP
    END

```

## BLOCK DATA

```

C
COMMON /BLK1/ IN,OUT
2      /BLK3/ TFILE
2      /BLK4/ TCHAR
3      /BLK5/ MFLAG,ERRCT,CURLIN
INTEGER*2 TCHAR
INTEGER IN,OUT,TFILE,ERRCT,CURLIN
LOGICAL MFLAG
1 DATA IN/5/,OUT/6/,TCHAR/'3',ERRCT/0/,MFLAG/.FALSE./,CURLIN/1/,
    TFILE/2/
    END

```

## SUBROUTINE LIST(CLINE)

DISPLAYS TEXT TO THE TERMINAL

```

C
C
C
1 COMMON /BLK1/ IN,OUT
2      /BLK2/ LPTR,MAXLIN,EOF
      /BLK5/ MFLAG,ERRCT,CURLIN
INTEGER*2 BLNK,LPTR,COMMA,OUTLIN,CLINE
INTEGER IN,OUT,I,J,N1,N2,MAXLIN,EOF,ERRCT,CURLIN,FETCH
LOGICAL MFLAG,EFLAG
DIMENSION CLINE(80),OUTLIN(80),LPTR(4000)
2100 DATA BLNK/' ',COMMA/','/,FETCH/0/
2110 FORMAT (' -INVALID COMMAND-')
2120 FORMAT (' ',I4,IX,80A1)
    FORMAT (' -EOF-')

```

```

C
C
C
IF COL 2 IS BLANK, PRINT CURLIN AND EXIT
IF (CLINE(2) .EQ. BLNK) THEN DO
    CALL MEMORY (FETCH,OUTLIN,LPTR(CURLIN))
    WRITE (OUT,2110) CURLIN, OUTLIN
ELSE DO
    NOW CHECK FOR LINE NUMBERS IN COMMAND
    CALL COMLIN(2,CLINE,N1,N2,EFLAG)
    IF (N1 .LE. 0) N1 = 1
    IF (N1 .GT. N2) EFLAG = .TRUE.
    IF (N1 .GE. EOF) EFLAG = .TRUE.
    IF (EFLAG) THEN DO
        ERRCT = ERRCT + 1
        WRITE (OUT,2100)
    ELSE DO
        ERRCT = 0
        I = N1
    END DO

```

```

        WHILE ((I.LE.N2).AND.(I.LT.EOF)) DO
            CALL MEMORY (FETCH,OUTLIN,LPTR(I))
            WRITE (OUT,2110) I, OUTLIN
            CURLIN = I
            I = I + 1
        END WHILE
        IF (I.GE.EOF) WRITE (OUT,2120)
    END IF
END IF
RETURN
END

```

## SUBROUTINE SCREEN(CLINE)

```

C
C
C      DISPLAYS 20 LINES BEGINNING WITH CURLIN OR OTHER SPECIFIED LINE
COMMON   /BLK1/ IN,OUT
1         /BLK2/ LPTR,MAXLIN,EOF
2         /BLK5/ MFLAG,ERRCT,CURLIN
1        INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,I,N1,N2,LIMIT,
        FETCH,N
        INTEGER*2 CLINE,LPTR,OUTLIN,BLNK
        LOGICAL MFLAG,EFLAG
        DIMENSION CLINE(80),OUTLIN(80),LPTR(400)
        DATA BLNK/' '/,FETCH/0/
2100      FORMAT (' -INVALID COMMAND-')
2110      FORMAT (' ',I4,LX,80A1)
2120      FORMAT (' -EOF-')
C
        EFLAG = .FALSE.
        FIND OUT WHETHER USER SPECIFIED A LINE
        IF (CLINE(2).NE.BLNK) THEN DO
            CALL COMLIN(2,CLINE,N1,N2,EFLAG)
            IF (N1.LE.0) N1 = 1
            IF (N1.GE.EOF) EFLAG = .TRUE.
            IF (.NOT.EFLAG) CURLIN = N1
        END IF
        IF (EFLAG) THEN DO
            ERRCT = ERRCT + 1
            WRITE (OUT,2100)
        ELSE DO
            ERRCT = 0
            LIMIT = MIN0(CURLIN+19,EOF-1)
            DO 10 I = CURLIN,LIMIT
                CALL MEMORY(FETCH,OUTLIN,LPTR(I))
                WRITE (OUT,2110) I,OUTLIN
            CONTINUE
            CURLIN = LIMIT
            IF (LIMIT.EQ.EOF-1) WRITE (OUT,2120)
        END IF
RETURN
END

```

## SUBROUTINE RL(CLINE)

REPLACES CURRENT LINE OR THE SPECIFIED LINE OR LINES WITH  
ANY NUMBER OF LINES

```

COMMON /BLK1/ IN,OUT
        /BLK2/ LPTR,MAXLIN,EOF
        /BLK5/ MFLAG,ERRCT,CURLIN
1  INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,I,N1,N2,I,J,LIMIT,
2  STORE
1  INTEGER*2 CLINE,LPTR,BLNK
   LOGICAL MFLAG,EFLAG
   DIMENSION CLINE(80),LPTR(4000)
   DATA BLNK/' '/,STORE/1/
   FORMAT (' -INVALID COMMAND-')
```

```

N1 = CURLIN
N2 = N1
DETERMINE WHICH LINE(S) TO REPLACE
IF (CLINE(3).NE.BLNK) THEN DO
   CALL COMLIN(3,CLINE,N1,N2,EFLAG)
   IF (N1 .LE. 0) EFLAG = .TRUE.
   IF (N1 .GE. EOF) EFLAG = .TRUE.
   IF (.NOT. EFLAG) CURLIN = N1
END IF
IF (EFLAG) THEN DO
   ERRCT = ERRCT + 1
   WRITE (OUT,2100)
ELSE DO
   ERRCT = 0
   IF (N2 .GE. EOF) N2 = EOF - 1
   REMOVE DESIGNATED LINES
   N = N2 - N1 + 1
   DO 20 I = 1,N
      LIMIT = EOF - 2
      CALL PUSH(LPTR(N1))
      DO 10 J = N1,LIMIT
         LPTR(J) = LPTR(J+1)
10      CONTINUE
      EOF = EOF - 1
20      CONTINUE
   NOW INPUT REPLACEMENT LINES
   CALL INPUT
END IF
RETURN
END
```

## SUBROUTINE AL(CLINE)

```

INPUT TEXT AFTER LINE N
COMMON /BLK1/ IN,OUT
```

```

1          /BLK5/ MFLAG,ERRCT,CURLIN
          INTEGER*2 BLNK,CLINE
          INTEGER IN,OUT,I,J,N,N1,N2,ERRCT,CURLIN
          LOGICAL MFLAG,EFLAG
          DIMENSION CLINE(80)
          DATA BLNK/' '/
2100      FORMAT (' -INVALID COMMAND-')
C
C          EXTRACT LINE NUMBER FROM COMMAND LINE
          CALL COMLIN(3,CLINE,N1,N2,EFLAG)
          IF (N1 .LT. 0) EFLAG = .TRUE.
          N = N1
          IF (EFLAG) THEN DO
              ERRCT = ERRCT + 1
              WRITE (OUT,2100)
          ELSE DO
              ERRCT = 0
              CURLIN = N + 1
              CALL INPUT
          END IF
          RETURN
          END

SUBROUTINE DS(CLINE)
C
C
C          PART OF SLED PACKAGE
          DISPLAYS ALL LINES CONTAINING THE DESIGNATED STRING, POSSIBLY
          LIMITED TO LINES N THROUGH M.
C
          COMMON /BLK1/ IN,OUT
1          /BLK2/ LPTR,MAXLIN,EOF
2          /BLK5/ MFLAG,ERRCT,CURLIN
          INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,N1,N2,NC,FETCH,MC1
          INTEGER*2 CLINE,LPTR,BLNK,STRING,LINE
          LOGICAL MFLAG,EFLAG,MATCH,FOUND
          DIMENSION CLINE(80),LINE(80),LPTR(4000),STRING(80)
          DATA BLNK/' '/,FETCH/0/
2100      FORMAT (' -INVALID COMMAND-')
2110      FORMAT (' ',I4,1X,80A1)
2220      FORMAT (' OLD STRING?>')
2250      FORMAT (' -NO STRING FOUND-')
C
          DEFAULT VALUES
          FOUND = .FALSE.
          EFLAG = .FALSE.
          N1 = 1
          N2 = EOF - 1
          DETERMINE WHETHER N1,N2 WERE SPECIFIED BY USER
          IF (CLINE(3) .NE. BLNK) THEN DO
              CALL COMLIN(3,CLINE,N1,N2,EFLAG)
              IF (N1 .GE. EOF) EFLAG = .TRUE.
              IF (N2 .GE. EOF) N2 = EOF - 1
              IF (N1 .LE. 0) N1 = 1
          END IF

```

```

IF (EFLAG) THEN DO
  ERRCT = ERRCT + 1
  WRITE (OUT,2100)
ELSE DO
  ERRCT = 0
  FETCH STRING; ISSUE PROMPT IF NECESSARY
  IF (.NOT. MFLAG) WRITE (OUT,2220)
  CALL GETLIN (STRING,NC)
  IF (NC .LE. 0) THEN DO
    ERRCT = ERRCT + 1
    WRITE (OUT,2100)
  ELSE DO
    DO 20 I = N1,N2
      CALL MEMORY(FETCH,LINE,LPTR(I))
      CALL SEARCH(LINE,STRING,NC,MATCH,MCL)
      IF (MATCH) THEN DO
        FOUND = .TRUE.
        WRITE (OUT,2110) I,LINE
        CURLIN = I
      END IF
    CONTINUE
    IF (.NOT. FOUND) WRITE (OUT,2250)
  END IF
END IF

```

20

```

END IF
RETURN
END
SUBROUTINE RS(CLINE)

```

```

PART OF SLED PACKAGE
REPLACES THE FIRST OCCURRENCE OF STRING1 WITH STRING2 ON THE
CURRENT LINE OR WITHIN THE SPECIFIED RANGE OF LINES

```

```

COMMON /BLK1/ IN,OUT
1 /BLK2/ LPTR,MAXLIN,EOF
2 /BLK5/ MFLAG,ERRCT,CURLIN
INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,N1,N2,I,J,K,L,M,
1 N,MCL,NC1,NC2,FETCH,STORE
INTEGER*2 CLINE,LPTR,BLNK,STR1,STR2,LINE
DIMENSION LPTR(4000),CLINE(80),STR1(80),STR2(80),LINE(80)
DATA BLNK/' '/,FETCH/0/,STORE/1/
LOGICAL MFLAG,FOUND,MATCH,EFLAG
2100 FORMAT (' -INVALID COMMAND-')
2110 FORMAT (' ',I4,1X,80A1)
2230 FORMAT (' OLD STRING?>')
2240 FORMAT (' NEW STRING?>')
2250 FORMAT (' -NO STRING FOUND-')

```

```

DEFAULT CONDITIONS
N1 = CURLIN
N2 = N1
EFLAG = .FALSE.
INTERPRET COMMAND LINE
IF (CLINE(3).NE.BLNK) THEN DO
  CALL COMLIN(3,CLINE,N1,N2,EFLAG)
  IF (N1 .LE. 0) EFLAG = .TRUE.

```

```

      IF (N1 .GE. EOF) EFLAG = .TRUE.
      IF (N2 .GE. EOF) N2 = EOF - 1
END IF
IF (EFLAG) THEN DO
  ERRCT = ERRCT + 1
  WRITE (OUT,2100)
ELSE DO
  ERRCT = 0
  READ IN TWO STRINGS; PROMPT IF NECESSARY
  IF (.NOT. MFLAG) WRITE (OUT,2230)
  CALL GETLIN(STR1,NC1)
  IF (NC1 .LE. 0) EFLAG = .TRUE.
  IF (.NOT. MFLAG) WRITE (OUT,2240)
  CALL GETLIN(STR2,NC2)
  IF (EFLAG) THEN DO
    ERRCT = ERRCT + 1
    WRITE (OUT,2100)
    RETURN
  END IF
  NOW FIND STRING1
  FOUND = .FALSE.
  DO 50 K = N1,N2
    CALL MEMORY(FETCH,LINE,LPTR(K))
    CALL SEARCH(LINE,STR1,NC1,MATCH,MCI)
    IF (MATCH) THEN DO
      NOW MAKE SUBSTITUTION
      J = MCI
      FOUND = .TRUE.
      DELETE STRING1
      DO 20 I = 1,NC1
        DO 10 M = J,79
          LINE(M) = LINE(M+1)
        CONTINUE
      CONTINUE
      NOW MAKE ROOM FOR STRING2
      IF (NC2 .GT. 0) THEN DO
        DO 40 L = 1,NC2
          M = 81 - J
          DO 30 I = 2,M
            LINE(82-I) = LINE(81-I)
          CONTINUE
        CONTINUE
        NOW INSERT NEW STRING
        DO 45 I = 1,NC2
          LINE(J+I-1) = STR2(I)
        CONTINUE
      END IF
      STORE REVISED LINE
      CALL MEMORY(STORE,LINE,LPTR(K))
      DISPLAY REVISED LINE
      WRITE (OUT,2110) K,LINE
      REMOVE "C" IN CC 1 OF ABOVE LINE TO ENABLE
      DISPLAY OF EACH LINE IN WHICH A STRING HAS BEEN
      REPLACED
      CURLIN = K
    END IF
  END DO

```



```

      END IF
50     CONTINUE
      IF (.NOT. FOUND) WRITE (OUT,2250)
      END IF
      RETURN
      END
      SUBROUTINE CT

```

```

      PART OF SLED PACKAGE
      CHANGES THE MESSAGE TERMINATOR TO ANY VALID CHARACTER

```

```

      COMMON /BLK1/ INT,OUT
      /BLK4/ TCHAR
      /BLK5/ MFLAG,ERRCT,CURLIN

```

```

      INTEGER IN,OUT,ERRCT,CURLIN,NC
      INTEGER*2 TCHAR,INLIN,BLNK
      LOGICAL MFLAG

```

```

      DIMENSION INLIN(80)

```

```

      DATA BLNK/' '/

```

```

      FORMAT (' -INVALID COMMAND-')

```

```

      FORMAT (' TERMINATOR?>')

```

```

      IF (.NOT. MFLAG) THEN DO

```

```

        ISSUE PROMPT

```

```

        WRITE (OUT,2200)

```

```

      END IF

```

```

      CALL GETLIN(INLIN,NC)

```

```

      IF ((NC.EQ.0).OR.(INLIN(1).EQ.BLNK)) THEN DO

```

```

        ERRCT = ERRCT + 1

```

```

        WRITE (OUT,2100)

```

```

      ELSE DO

```

```

        TCHAR = INLIN(1)

```

```

      END IF

```

```

      RETURN

```

```

      END

```

```

      SUBROUTINE MENU

```

```

      PART OF SLED PACKAGE

```

```

      PROVIDES USER WITH A SUMMARY OF AVAILABLE COMMANDS
      AND THEIR FORMATS.

```

```

      COMMON /BLK1/ IN,OUT

```

```

      INTEGER IN,OUT

```

```

200  FORMAT (' SLED COMMAND SUMMARY: '// LINE/TEXT INSERT',T39,
1     'STRING REPLACEMENT',/3X,'ALN',T10,'INSERT <A>FTER <L>INE N',
2     T40,'RS&P&Q&',T48,'<R>EPLACE <S>TRING',/3X,'RLN',T10,
3     '<R>EPLACE <L>INE N .OR.',T40,'RSN&P&Q&',T50,' "P" WITH "Q" IN' /
4     3X,'RLN,M',T15,'LINES N THRU M',T40,'RSN,M&P&Q&',T52,
5     'INDICATED LINES.'// OUTPUT COMMANDS',T38,'STRING SEARCH' /
6     3X,'L',T10,'DISPLAY CURRENT <L>INE',T40,'DS&P&',T48,
7     '<D>ISPLAY LINES',/3X,'LN',T10,'OR LINE N.',T50,
8     'WITH <S>TRING "P"',/3X,'LN,M',T10,'LINES N THRU M',T40,
9     'DSN,M&P&',T48,'OR SHOW ANY LINES')
201  FORMAT (3X,'S',T10,'<S>HOW A',
X     '"SCREEN" OF LINES',T50,'N-M CONTAINING "P"'/3X,'SN',T10,

```

```

1  'SHOW A SCREEN FROM LINE N',T38,'CONTROL COMMANDS'//
2  3X,' ',T10,'SHOW COMMAND <M>ENJ (THIS)',T40,' ',T48,
3  '<O>PEN A FILE OR',T3X,'V',T10,'SHOW <V>ERSION INFORMATION',
4  T52,'CREATE A FILE FOR EDITING',T40,'CT <C>HANGE THE LOGICAL'
5  5X,'TD <Q>UIT THE EDIT TYPE "QKRET"',T40,'MESSAGE <T>ERMIN',
6  'ATOR')
WRITE (OUT,200)
WRITE (OUT,201)
RETURN
END
SUBROUTINE VERS

```

PART OF SLED PACKAGE

```

COMMON /BLK1/ IN,OUT
INTEGER IN,OUT
220 FORMAT (' SLED VERSION FORT1.1 NPS MONTEREY 800401'//
1  ' LOCAL EXPERT IS C. TAYLOR 408-646-2691 0900-1700 PST/PDT'//
2  ' LINE DELETE KEY IS < > (ASCII) OR <CENT SIGN> ',
3  '(EBCDIC)'// ' CHARACTER DELETE KEY IS <@>'//
4  ' EDITOR LOGICAL MESSAGE TERMINATORS ARE:'//
5  ' (1) <RETURN> AND (2) <$>'//
6  ' AND CAN BE CHANGED TO ANY STANDARD FORTRAN CHARACTER.'//
7  ' ALL INPUT IS TRANSLATED TO UPPER CASE.'//
8  ' THE FOLLOWING DEVIATIONS FROM SLED STANDARD WERE REQUIRED:')
221 FORMAT (
9  ' (1) THE UNIVERSAL ENTRY COMMAND "SLED" INVOKES INSTRUCTIONS
*  ' FOR A NON-STANDARD ENTRY: "SLED1 <FILENAME> <FILETYPE>
1  "'// ' (2) ONLY ONE FILE PER SESSION CAN BE OPENED.'//
2  ' (3) MAXIMUM FILESIZE IS 4000 LINES.'//
3  ' (4) THE USER IS ASKED TO INDICATE WHETHER HE IS EDITING A '
4  ' NEW FILE IN ORDER TO PREVENT A DISK READ ERROR IN FORTRAN
5N.'// ' (5) WHEN <RETURN> IS USED AS A LOGICAL MESSAGE '
6  ' TERMINATOR, THE LINE OR STRING IS PADDED WITH BLANKS UN
7/ ' THE RIGHT. THIS AFFECTS THE RS FUNCTION ONLY.')
222 FORMAT (
1  ' (6) ONLY THE FIRST OCCURRENCE OF A STRING IN EACH LINE'//
2  ' IS REPLACED TO PERMIT FREE SUBSTITUTIONS OF BLANKS')
WRITE (OUT,220)
WRITE (OUT,221)
WRITE (OUT,222)
RETURN
END
SUBROUTINE OPEN

```

OPENS TEXT FILE AND WORKSPACE FILE  
 READS TEXT FILE INTO WORKSPACE IF IT ALREADY EXISTS  
 INITIALIZES POINTERS ETC.

```

COMMON /BLK1/ IN,OUT
1  /BLK2/ LPTR,MAXLIN,EOF
2  /BLK3/ TFILE
3  /BLK5/ MFLAG,ERRCT,CURLIN
4  /BLK6/ STACK,STKPTR
INTEGER IN,OUT,TFILE,LINE,ERRCT,CURLIN,STORE,MAXLIN,EOF,

```

```

1      STKPTR, I, NC
      INTEGER*2 LPTR, STACK, FNAME, INLIN, YES, NO, REPLY, BLINE
      LOGICAL MFLAG
      DIMENSION LPTR(4000), BLINE(80), STACK(4000), FNAME(80), INLIN(80)
      DATA YES/'Y'/, BLINE/80*' '/, NO/'N'/, STORE/1/
100 )  FORMAT (80A1)
2040   FORMAT ('-',14,' LINES IN FILE: ',80A1)
2050   FORMAT (' -CREATING FILE: ',80A1)
2400   FORMAT (' FILENAME?>')
2410   FORMAT (' IS THIS A NEW FILE?>')
2420   FORMAT (' -MAX CAPACITY 4000 LINES EXCEEDED-')

C
C      INITIALIZE
      MAXLIN = 4000
      CURLIN = 1
C
C      READ IN FILENAME (COSMETIC)
      IF (.NOT. MFLAG) WRITE (OUT,2400)
      CALL GETLIN(FNAME,NC)
C
5      ASK WHETHER IT IS A NEW FILE (TO PREVENT FORTRAN READ ERROR)
      WRITE (OUT,2410)
      READ (IN,1000) INLIN
      REPLY = INLIN(1)
      IF ((REPLY.NE.YES).AND.(REPLY.NE.NO)) GO TO 5
      IF (REPLY.EQ.YES) THEN DO
          WRITE (OUT,2050) FNAME
          EOF = 1
          STKPTR = 1
          ACTIVATE FILE WITH AN ACCESS
          LPTR(1) = 1
          CALL MEMORY(STORE,BLINE,LPTR(1))
C
C      ELSE DO
          NOW READ IN TEXT FILE
          LINE = 0
          WHILE (.TRUE.) DO
              READ (TFILE,1000,END=10) INLIN
              LPTR(LINE+1) = LINE + 1
              CALL MEMORY(STORE,INLIN,LPTR(LINE+1))
              LINE = LINE + 1
          END WHILE
10      CONTINUE
          IF (LINE.GE.MAXLIN) THEN DO
              WRITE (OUT,2420)
              STOP
          END IF
          STKPTR = LINE + 1
          EOF = STKPTR
          TELL USER FILE OPEN
          WRITE (OUT,2040) LINE, FNAME
C
C      END IF
      DO 20 I = 1,MAXLIN
          STACK(I) = I
20      CONTINUE
      RETURN
      END
      SUBROUTINE QUIT

```

```

C
C      PART OF THE SLED PACKAGE
C      CLOSES OUT THE WORK FILE AND WRITES THE NEW OR UPDATED
C      TEXT FILE
C
1      COMMON /BLK2/ LPTR,MAXLIN,EOF
2      /BLK3/ TFILE
      /BLK1/ IN,OUT
      INTEGER MAXLIN,IN,OUT,EOF,TFILE,L,LIMIT
      INTEGER*2 LINE,LPTR
      DIMENSION LPTR(4000),LINE(80)
2000   FORMAT (80A1)
2450   FORMAT ('-',I4,' LINES WRITTEN-')
C
      REWIND TFILE
      LIMIT = EOF - 1
      DO 90 L = 1,LIMIT
          CALL MEMORY(FETCH,LINE,LPTR(L))
          WRITE (TFILE,2000) LINE
90     CONTINUE
      WRITE (OUT,2450) LIMIT
      RETURN
      END
      SUBROUTINE MEMORY(ACTION,LINE,PTR2)
C
C      PART OF SLED PACKAGE
C      HANDLES ALL MEMORY REFERENCES USING DIRECT-ACCESS DISK FILE
C      CURRENT CAPACITY IS 4000 LINES
C      REQUIRES AT LEAST 3 DEDICATED CYLINDERS OF DISK SPACE FOR
C      WORK FILE UNDER CP/CMS ON AN IBM 360/67
C
      COMMON /BLK3/ TFILE
      INTEGER WFILE,TFILE,ACTION,STORE,PTR,AVAR,ERRS
      INTEGER*2 LINE,PTR2
      DIMENSION LINE(80)
      DATA STORE/1/
1000   FORMAT (80A1)
C
      DEFINE WORK FILE
      WFILE = 13
      DEFINE FILE 13(4000,80,E,AVAR)
      CONVERT PTR2 FROM INTEGER*2 TO INTEGER
      PTR = PTR2
      INITIALIZE READ ERROR COUNTER AND BEGIN
      ERRS = 0
      IF (ACTION .EQ. STORE) THEN DO
          WRITE (WFILE,PTR,1000) LINE
      ELSE DO
          FETCH
5      READ (WFILE,PTR,1000,ERR=99) LINE
      END IF
      RETURN
99   ERRS = ERRS + 1
      IF (ERRS .LT. 10) GO TO 5
      STOP

```

END  
SUBROUTINE INPUT

IMPLEMENTS THE INPUT MODE

```

COMMON /BLK1/ IN,OUT
      /BLK2/ LPTR,MAXLIN,EOF
      /BLK5/ MFLAG,ERRCT,CURLIN
1     INTEGER*2 PD,LPTR,BLNK,OUTLIN
2     INTEGER MAXLIN,EOF,ERRCT,CURLIN,STOPE,I,J,IN,OUT,NC
      LOGICAL MFLAG
      DIMENSION LPTR(4000),OUTLIN(90)
      DATA PD/'.'/,STORE/1/,BLNK/' '/
2110  FORMAT (' I>')
      IF NO INPUT IN QUEUE, PROMPT USER
      IF (.NOT.MFLAG) WRITE (OUT,2110)
      CALL GETLIN(OUTLIN,NC)
      WHILE (.NOT.((OUTLIN(1).EQ.PD).AND.(OUTLIN(2).EQ.BLNK))) DO
        IF (NC.GT.0) THEN DO
          UNLESS IT WAS A NULL LINE
          MAKE ROOM FOR NEW INPUT
          IF (CURLIN.LT.EOF) THEN DO
            J = EOF - CURLIN
            DO 10 I = 1,J
              LPTR(EOF + 1 - I) = LPTR(EOF - I)
            CONTINUE
          ELSE DO
            CURLIN = EOF
            KEEPS INPUT TEXT CONTIGUOUS
          END IF
          EOF = EOF + 1
          GET A NUMBER FOR NEW LINE FROM STACK
          CALL POP(LPTR(CURLIN))
          NOW STORE THE NEW LINE
          CALL MEMORY(STORE,OUTLIN,LPTR(CURLIN))
          CURLIN = CURLIN + 1
        END IF
        IF NOTHING IN QUEUE, PROMPT USER
        IF (.NOT.MFLAG) WRITE (OUT,2110)
        CALL GETLIN(OUTLIN,NC)
      END WHILE
RETURN
END

```

SUBROUTINE GETLIN(OUTLIN,NC)

GETS A LINE FROM TERMINAL; QUEUES UP MULTIPLE LINES

```

COMMON /BLK1/ IN,OUT
      /BLK4/ TCHAR
      /BLK5/ MFLAG,ERRCT,CURLIN
1     INTEGER*2 INLIN,OUTLIN,QUEUE,BLNK,TCHAR
2     INTEGER IN,OUT,ERRCT,CURLIN,I,J,K,LINELN,ENDJ,NC,NCHARS
      LOGICAL MFLAG,NFLAG

```

```

DIMENSION INLIN(80),OUTLIN(80),QUEUE(30,10),NCHARS(10)
DATA BLNK/' '/,LINELN/80/,ENDQ/0/,ENDQ/0/
1010 FORMAT (30A1)
2060 FORMAT (' -TRUNCATED; ONLY 10 ITEMS PER LINE-')
2070 FORMAT (' -ILLEGAL CHARACTER OR BLANK COMMAND-')
C
C
MFLAG .DOES TRUE WHEN MULTIPLE INPUT LINES ARE STACKED
IF (.NOT.MFLAG) THEN DO
  READ (IN,1010,ERR=99,END=98) INLIN
  I = 1
  WHILE ((I.LE.LINELN).AND.(INLIN(I).NE.TCHAR)) DO
    OUTLIN(I) = INLIN(I)
    I = I + 1
  END WHILE
  NC = I - 1
  IF (INLIN(I).EQ.TCHAR) MFLAG = .TRUE.
  IF (I.LE.LINELN) THEN DO
    DO 20 K = I,LINELN
      OUTLIN(K) = BLNK
20    CONTINUE
  END IF
  WHILE (INLIN(I).EQ.TCHAR) DO
    IF (ENDQ.GE.10) THEN DO
      WRITE (OUT,2060)
      INLIN(I) = BLNK
    ELSE DO
      ENDQ = ENDQ + 1
      I = I + 1
      J = 1
      NFLAG = .TRUE.
      WHILE ((I.LE.LINELN).AND.(INLIN(I).NE.TCHAR)) DO
        QUEUE(J,ENDQ) = INLIN(I)
        IF (INLIN(I).NE.BLNK) NFLAG = .FALSE.
        I = I + 1
        J = J + 1
      END WHILE
      NCHARS(ENDQ) = J - 1
      IF ((I.GT.LINELN).AND.NFLAG) NCHARS(ENDQ)=0
      IF (J.LE.LINELN) THEN DO
        DO 30 K = J,LINELN
          QUEUE(K,ENDQ) = BLNK
30    CONTINUE
        END IF
      END WHILE
    END IF
  ELSE
    DO
      GET LINE FROM QUEUE INSTEAD
      BQ = BQ + 1
      NC = NCHARS(BQ)
      DO 40 I = 1,LINELN
        OUTLIN(I) = QUEUE(I,BQ)
40    CONTINUE
      IF (BQ.EQ.ENDQ) THEN DO
        BQ = 0
        ENDQ = 0
      END IF
    END IF
  END IF

```

```
          MFLAG = .FALSE.  
        END IF  
      END IF  
      RETURN  
95     CONTINUE  
      REWIND IN  
99     CONTINUE  
      WRITE (OUT,2070)  
      OUTLIN(1) = 3LNK  
      RETURN  
      END
```

## SUBROUTINE PUSH(X)

PUSHES A POINTER TO A FREE LINE ONTO THE STACK

```
COMMON  /BLK1/ IN,OUT  
        /BLK5/ STACK,STKPTR  
1     INTEGER STKPTR,IN,OUT  
      INTEGER*2 STACK,X  
2080    DIMENSION STACK(4000)  
      FORMAT (' -FREE LINE LIST STACK OVERFLOW-')
```

```
      IF (STKPTR.GT.1) THEN DO  
        STKPTR = STKPTR - 1  
        STACK(STKPTR) = X  
      ELSE DO  
        STACK OVERFLOW  
        WRITE (OUT,2080)
```

```
      END IF  
      RETURN  
      END
```

## SUBROUTINE POP(X)

POPS A POINTER TO A FREE LINE FROM THE STACK

```
COMMON  /BLK1/ IN,OUT  
        /BLK2/ LPTR,MAXLIN,EOF  
        /BLK6/ STACK,STKPTR  
1     INTEGER STKPTR,MAXLIN,EOF,IN,OUT  
2     INTEGER*2 STACK,LPTR,X  
2090    DIMENSION STACK(4000),LPTR(4000)  
      FORMAT (' -ALL SYSTEM BUFFERS FULL-')
```

```
      X = STACK(STKPTR)  
      IF (STKPTR .LT. MAXLIN) THEN DO  
        STKPTR = STKPTR + 1  
      ELSE DO  
        WRITE (OUT,2090)
```

```
      END IF  
      RETURN  
      END
```

SUBROUTINE CNVRT (STRING, I, J, N)

```

C
C
C      CONVERTS CHARACTERS I THROUGH J OF STRING INTO AN INTEGER N
      INTEGER*2 STRING, DIGIT
      INTEGER I, J, N, K, L
      DIMENSION STRING(80), DIGIT(10)
      DATA DIGIT/'0','1','2','3','4','5','6','7','8','9'/
      N = 0
      DO 20 K = I, J
         L = 1
         WHILE (STRING(K).NE.DIGIT(L)) DO
            L = L + 1
         END WHILE
         IF (L.LE.10) THEN DO
            N = N + (L-1)*(10**(J-K))
         ELSE DO
            N = -99999999
            RETURN
         END IF
      20 CONTINUE
      RETURN
      END

```

SUBROUTINE COMLINE (C1, CLINE, N1, N2, EFLAG)

```

C
C
C      FINDS AND INTERPRETS THE LINE NUMBERS CONTAINED ON A
C      COMMAND LINE. CHECKS FOR ERRORS.
      INTEGER C1, N1, N2, I, J
      INTEGER*2 CLINE, BLNK, COMMA
      LOGICAL EFLAG
      DIMENSION CLINE(80)
      DATA BLNK/' ', COMMA/', '/
      EFLAG = .FALSE.
      FIND FIRST DIGIT
      I = C1
      J = I
      WHILE ((CLINE(J).NE.BLNK).AND.(CLINE(J).NE.COMMA)) DO
         J = J + 1
      END WHILE
      IF (J.GE.90) THEN DO
         EFLAG = .TRUE.
      ELSE DO
         CONVERT FIRST NUMBER TO AN INTEGER
         CALL CNVRT (CLINE, I, J-1, N1)
         LOOK FOR SECOND NUMBER
         I = J + 1
         J = I
         WHILE (CLINE(J).NE.BLNK) DO
            J = J + 1
         END WHILE
         IF (J.GE.80) THEN DO

```



```

      EFLAG = .TRUE.
    ELSE JJ
      IF (I .EQ. J) THEN DO
        NO SECOND NUMBER EXISTS
        N2 = N1
      ELSE JO
        CONVERT SECOND NUMBER
        CALL CNVRT (CLINE,I,J-1,N2)
      END IF
      IF (N1 .GT. N2) EFLAG = .TRUE.
    END IF
  END IF
RETURN
END
SUBROUTINE SEARCH(LINE,STRING,NC,MATCH,MCI)

  PART OF SLED PACKAGE
  SEARCHES 'LINE' FOR THE FIRST OCCURRENCE OF 'STRING'.
  'MATCH' IS SET TO '.TRUE.' IF A MATCH IS FOUND.
  'NC' IS THE NUMBER OF CHARACTERS IN 'STRING' (REQUIRED INPUT)
  'MCI' IS AN OUTPUT INDICATING FIRST COL OF MATCH

  INTEGER I,J,L,NC,MCI
  INTEGER*2 LINE,STRING
  LOGICAL MATCH
  DIMENSION LINE(80),STRING(80)

  J = 1
  MATCH = .FALSE.
  WHILE ((.NOT.MATCH).AND.(J.LE.81-NC)) DO
    WHILE ((STRING(1).NE.LINE(J)).AND.(J.LE.81-NC)) DO
      J = J + 1
    END WHILE
    IF (J.LE.81-NC) THEN DO
      I = 1
      L = J
      WHILE ((STRING(I+1).EQ.LINE(L+1)) .AND.
             ((L+1).LT.80).AND.(I+1.LE.NC)) DO
        L = L + 1
        I = I + 1
      END WHILE
      IF (I .EQ. NC) THEN DO
        MATCH = .TRUE.
      ELSE DO
        J = J + 1
      END IF
    END IF
  END WHILE
  MCI = J
RETURN
END

```

SLED - FORTRAN IV

10/02/80 12.22.02

FILE: SLED2 FORTRAN T1 NAVAL POSTGRADUATE SCHOOL

STANDARD LINE EDITOR--FORTRAN IMPLEMENTATION

SLED VERSION FORT1.1 NPS MONTEPEY 800401  
PROGRAMMED BY: C. F. TAYLOR, JR., CODE 55TA

FOR FURTHER INFORMATION SEE NPS TECHNICAL REPORT  
NPS 52-30-001 BY L. A. COX, JR.

MAIN PROGRAM:

READS IN COMMANDS AND CALLS THE APPROPRIATE SUBROUTINE  
IMPLEMENTS THE "EDIT" MODE

COMMON /BLK1/IN,OUT /BLK5/MFLAG,ERRCT,CURLIN  
INTEGER\*2 C1,C2,A,C,D,L,M,O,Q,R,S,T,V,INLINE,BLNK  
INTEGER IN,OUT,ERRCT,CURLIN,NC  
DIMENSION INLINE(30)  
LOGICAL FLAG,OPENFL,MFLAG  
DATA A/'A'/,C/'C'/,D/'D'/,L/'L'/,M/'M'/,O/'O'/,Q/'Q'/,R/'R'/,S/'S'  
\*'/,T/'T'/,V/'V'/,BLNK/' '/

2000 FORMAT (' E>')  
2010 FORMAT (' -INVALID COMMAND- ',Z41)  
2020 FORMAT (' -NO TEXT FILE OPEN-')  
2030 FORMAT (' -ONLY ONE FILE CAN BE OPENED PER SESSION IN THIS ', 'VER

\*SION OF SLED-')

EDIT MODE--WRITE PROMPT

WRITE (OUT,2000)

CALL GETLIN(INLINE,NC)

C1 = INLINE(1)

C2 = INLINE(2)

FLAG GOES FALSE AFTER 'QUIT'

FLAG = .TRUE.

OPENFL GOES TRUE AFTER FILE IS OPENED

OPENFL = .FALSE.

MAIN EDIT LOOP

9000 IF (.NOT. (FLAG) ) GO TO 9001  
IF (.NOT. (.NOT. (OPENFL .OR. (C1.EQ.O) .OR. (C1.EQ.M) .OR. (C1.E  
\*Q.V))) ) GO TO 9002

FILE NOT OPEN AND THIS IS NOT AN 'OPEN' COMMAND

OR A 'MENU' OR 'VERSION' REQUEST

WRITE (OUT,2020)

GO TO 9003

9002 CONTINUE

EMULATE CASE (SWITCH) STATEMENT TO PROCESS COMMANDS

IF (C1.EQ. BLNK) GO TO 200

IF (C1.NE.L) GO TO 10

CALL LIST(INLINE)

GO TO 200

10 CONTINUE

IF (C1.NE.S) GO TO 20

CALL SCREEN(INLINE)

GO TO 200

20 CONTINUE

IF ((C1.NE.R).OR.(C2.NE.S)) GO TO 30

```

      CALL RS(INLINE)
      GO TO 200
30    CONTINUE
      IF ((C1.NE.R).OR.(C2.NE.L)) GO TO 40
      CALL RL(INLINE)
      GO TO 200
40    CONTINUE
      IF ((C1.NE.A).OR.(C2.NE.L)) GO TO 50
      CALL AL(INLINE)
      GO TO 200
50    CONTINUE
      IF ((C1.NE.D).OR.(C2.NE.S)) GO TO 60
      CALL DS(INLINE)
      GO TO 200
60    CONTINUE
      IF (C1.NE.Q) GO TO 70
      CALL QUIT
      FLAG = .FALSE.
      GO TO 200
70    CONTINUE
      IF (C1.NE.V) GO TO 80
      CALL VERS
      GO TO 200
80    CONTINUE
      IF (C1.NE.M) GO TO 90
      CALL MENU
      GO TO 200
90    CONTINUE
      IF (C1.NE.O) GO TO 100
      IF (.NOT.(OPENFL)) GO TO 9004
      WRITE (OUT,2030)
      GO TO 9005
9004  CONTINUE
      CALL OPEN
      OPENFL = .TRUE.
9005  CONTINUE
      GO TO 200
100   CONTINUE
      IF ((C1.NE.C).OR.(C2.NE.T)) GO TO 110
      CALL CT(INLINE)
      GO TO 200
110   CONTINUE
C     IF PROGRAM GETS HERE, COMMAND IS INVALID
C     WRITE (OUT,2010) C1,C2
      ERRCT = ERRCT + 1
C     END CASE
      CONTINUE
200   IF (.NOT.(ERRCT.GE.2)) GO TO 9006
      CALL MENU
      ERRCT = 0
9006  CONTINUE
9003  CONTINUE
C     IF (.NOT.(FLAG)) GO TO 9008
      GET NEXT LINE

```

```

IF (.NOT.MFLAG) WRITE (OUT,2000)
CALL GETLIN(INLINE,NC)
C1 = INLINE(1)
C2 = INLINE(2)

```

```

9008 CONTINUE
GO TO 9000

```

```

9001 CONTINUE
STOP
END

```

BLOCK DATA

```

COMMON /BLK1/ IN,OUT /BLK3/ TFILE /BLK4/ TCHAR /BLK5/ MFLAG,ERRCT
*,CURLIN
INTEGER*2 TCHAR
INTEGER IN,OUT,TFILE,ERRCT,CURLIN
LOGICAL MFLAG
DATA IN/5/,OUT/6/,TCHAR/'5'/,ERRCT/0/,MFLAG/.FALSE./,CURLIN/1/,TFILE/2/
*END
END

```

SUBROUTINE LIST(CLINE)

DISPLAYS TEXT TO THE TERMINAL

```

COMMON /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK5/ MFLAG,ERRCT,
*,CURLIN
INTEGER*2 BLNK,LPTR,COMMA,OUTLIN,CLINE
INTEGER IN,OUT,I,J,N1,N2,MAXLIN,EOF,ERRCT,CURLIN,FETCH
LOGICAL MFLAG,EFLAG
DIMENSION CLINE(80),OUTLIN(80),LPTR(4000)
DATA BLNK/' '/,COMMA/','/,FETCH/0/
2100 FORMAT (' -INVALID COMMAND-')
2110 FORMAT (' ',I4,I4,30A1)
2120 FORMAT (' -EOF-')

```

```

IF COL 2 IS BLANK, PRINT CURLIN AND EXIT
IF (.NOT.(CLINE(2) .EQ. BLNK) ) GO TO 9010
CALL MEMORY (FETCH,OUTLIN,LPTR(CURLIN))
WRITE (OUT,2110) CURLIN, OUTLIN
GO TO 9011

```

```

9010 CONTINUE

```

```

NOW CHECK FOR LINE NUMBERS IN COMMAND
CALL COMLIN(2,CLINE,N1,N2,EFLAG)
IF (N1 .LE. 0) N1 = 1
IF (N1 .GT. N2) EFLAG = .TRUE.
IF (N1 .GE. EOF) EFLAG = .TRUE.
IF (.NOT.(EFLAG) ) GO TO 9012
ERRCT = ERRCT + 1
WRITE (OUT,2100)
GO TO 9013
9012 CONTINUE
ERRCT = 0

```

```

      I = N1
9014   IF (.NOT. ((I.LE.N2).AND.(I.LT.EOF)) ) GO TO 9015
      CALL MEMORY (FETCH,OUTLIN,LPTR(I))
      WRITE (OUT,2110) I, OUTLIN
      CURLIN = I
      I = I + 1
      GO TO 9014
9015   CONTINUE
      IF (I.GE.EOF) WRITE (OUT,2120)
9013   CONTINUE
9011   CONTINUE
      RETURN
      END

```

## SUBROUTINE SCREEN(CLIN)

```

C
C
C   DISPLAYS 20 LINES BEGINNING WITH CURLIN OR OTHER SPECIFIED LINE
COMMON  /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK5/ MFLAG,ERRCT
*CURLIN
INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,I,N1,N2,LIMIT, FETCH,N
INTEGER*2 CLINE,LPTR,OUTLIN,BLNK
LOGICAL MFLAG,EFLAG
DIMENSION CLINE(80),OUTLIN(80),LPTR(4000)
DATA BLNK/' '/,FETCH/0/
2100  FORMAT (' -INVALID COMMAND-')
2110  FORMAT (' ',I4,IX,30A1)
2120  FORMAT (' -EOF-')
C
EFLAG = .FALSE.
C   FIND OUT WHETHER USER SPECIFIED A LINE
IF (.NOT.(CLINE(2).NE.BLNK) ) GO TO 9014
CALL COMLIN(2,CLINE,N1,N2,EFLAG)
IF (N1.LE.0) N1 = 1
IF (N1.GE.EOF) EFLAG = .TRUE.
IF (.NOT. EFLAG) CURLIN = N1
9016  CONTINUE
IF (.NOT.(EFLAG) ) GO TO 9018
ERRCT = ERRCT + 1
WRITE (OUT,2100)
GO TO 9019
9018  CONTINUE
ERRCT = 0
LIMIT = MINO(CURLIN+19,EOF-1)
DO 10 I = CURLIN,LIMIT
CALL MEMORY(FETCH,OUTLIN,LPTR(I))
WRITE (OUT,2110) I,OUTLIN
10   CONTINUE
CURLIN = LIMIT
IF (LIMIT.EQ.EOF-1) WRITE (OUT,2120)
9019  CONTINUE
      RETURN
      END

```

## SUBROUTINE RL(CLINE)

REPLACES CURRENT LINE OR THE SPECIFIED LINE OR LINES WITH  
ANY NUMBER OF LINES

COMMON /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK5/ MFLAG,ERRCT,  
\*CURLIN

INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,N,N1,N2,I,J,LIMIT, STORE  
INTEGER\*2 CLINE,LPTR,BLNK  
LOGICAL MFLAG,EFLAG

DIMENSION CLINE(80),LPTR(4000)

DATA BLNK/' '/,STORE/1/

2100 FORMAT (' -INVALID COMMAND-')

N1 = CURLIN

N2 = N1

DETERMINE WHICH LINE(S) TO REPLACE

IF (.NOT.(CLINE(J).NE.BLNK) ) GO TO 9020

CALL COMLIN(3,CLINE,N1,N2,EFLAG)

IF (N1.LE.0) EFLAG = .TRUE.

IF (N1.GE.EOF) EFLAG = .TRUE.

IF (.NOT.EFLAG) CURLIN = N1

9020 CONTINUE

IF (.NOT.(EFLAG) ) GO TO 9022

ERRCT = ERRCT + 1

WRITE (OUT,2100)

GO TO 9023

9022 CONTINUE

ERRCT = 0

IF (N2.GE.EOF) N2 = EOF - 1

REMOVE DESIGNATED LINES

N = N2 - N1 + 1

DO 20 I = 1,N

LIMIT = EOF - 2

CALL PUSH(LPTR(N1))

DO 10 J = N1,LIMIT

LPTR(J) = LPTR(J+1)

10 CONTINUE

EOF = EOF - 1

20 CONTINUE

NOW INPUT REPLACEMENT LINES

CALL INPUT

9023 CONTINUE

RETURN

END

## SUBROUTINE AL(CLINE)

INPUT TEXT AFTER LINE N

COMMON /BLK1/ IN,OUT /BLK5/ MFLAG,ERRCT,CURLIN

```

      INTEGER*2 BLNK,CLINE
      INTEGER IN,OUT,I,J,N,N1,N2,ERRCT,CURLIN
      LOGICAL MFLAG,EFLAG
      DIMENSION CLINE(80)
      DATA BLNK/' '/
2100  FORMAT (' -INVALID COMMAND-')
C
C      EXTRACT LINE NUMBER FROM COMMAND LINE
      CALL COMLIN(3,CLINE,N1,N2,EFLAG)
      IF (N1 .LT. 0) EFLAG = .TRUE.
      N = N1
      IF (.NOT.(EFLAG) ) GO TO 9024
          ERRCT = ERRCT + 1
          WRITE (OUT,2100)
          GO TO 9025
9024  CONTINUE
          ERRCT = 0
          CURLIN = N + 1
          CALL INPUT
9025  CONTINUE
      RETURN
      END

      SUBROUTINE DS(CLINE)
C
C      PART OF SLE0 PACKAGE
C      DISPLAYS ALL LINES CONTAINING THE DESIGNATED STRING, POSSIBLY
C      LIMITED TO LINES N THROUGH M.
      COMMON /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK5/ MFLAG,ERRCT,CURLIN
      *LIN
      INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,N1,N2,NC,FETCH,MC1
      INTEGER*2 CLINE,LPTR,BLNK,STRING,LINE
      LOGICAL MFLAG,EFLAG,MATCH,FOUND
      DIMENSION CLINE(80),LINE(30),LPTR(4000),STRING(80)
      DATA BLNK/' '/,FETCH/0/
2100  FORMAT (' -INVALID COMMAND-')
2110  FORMAT (' ',(4,1X,80A1))
2220  FORMAT (' OLD STRING?>')
2250  FORMAT (' -NO STRING FOUND-')
C
C      DEFAULT VALUES
      FOUND = .FALSE.
      EFLAG = .FALSE.
      N1 = 1
      N2 = EOF - 1
C      DETERMINE WHETHER N1,N2 WERE SPECIFIED BY USER
      IF (.NOT.(CLINE(3) .NE. BLNK) ) GO TO 9026
          CALL COMLIN(3,CLINE,N1,N2,EFLAG)
          IF (N1 .GE. EOF) EFLAG = .TRUE.
          IF (N2 .GE. EOF) N2 = EOF - 1
          IF (N1 .LE. 0) N1 = 1
9026  CONTINUE
      IF (.NOT.(EFLAG) ) GO TO 9028

```



```

ERRCT = ERRCT + 1
WRITE (OUT,2100)
GO TO 9029
9028 CONTINUE
ERRCT = 0
FETCH STRING; ISSUE PROMPT IF NECESSARY
IF (.NOT. MFLAG) WRITE (OUT,2220)
CALL GETLIN (STRING,NC)
IF (.NOT.(NC .LE. 0) ) GO TO 9030
ERRCT = ERRCT + 1
WRITE (OUT,2100)
GO TO 9031
9030 CONTINUE
DO 20 I = N1,N2
CALL MEMORY(FETCH,LINE,LPTR(I))
CALL SEARCH(LINE,STRING,NC,MATCH,MC1)
IF (.NOT.(MATCH) ) GO TO 9032
FOUND = .TRUE.
WRITE (OUT,2110) I,LINE
CURLIN = I
9032 CONTINUE
20 CONTINUE
IF (.NOT. FOUND) WRITE (OUT,2250)
9031 CONTINUE
9029 CONTINUE
RETURN
END
SUBROUTINE RS(CLINE)

PART OF SLED PACKAGE
REPLACES THE FIRST OCCURRENCE OF STRING1 WITH STRING2 ON THE
CURRENT LINE OR WITHIN THE SPECIFIED RANGE OF LINES

COMMON /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK5/ MFLAG,ERRCT,CUR
*LIN
INTEGER IN,OUT,MAXLIN,EOF,ERRCT,CURLIN,N1,N2,I,J,K,L,M, N,MC1,NC1,
*NC2,FETCH,STORE
INTEGER*2 CLINE,LPTR,BLNK,STR1,STR2,LINE
DIMENSION LPTR(4000),CLINE(80),STR1(80),STR2(80),LINE(80)
DATA BLNK/' '/,FETCH/'/',STORE/'/'
LOGICAL MFLAG,FOUND,MATCH,EFLAG
2100 FORMAT (' -INVALID COMMAND-')
2110 FORMAT (' ',I4,1X,80A1)
2230 FORMAT (' OLD STRING?>')
2240 FORMAT (' NEW STRING?>')
2250 FORMAT (' -NO STRING FOUND-')

DEFAULT CONDITIONS
N1 = CURLIN
N2 = N1
EFLAG = .FALSE.
INTERPRET COMMAND LINE
IF (.NOT.(CLINE(3).NE.BLNK) ) GO TO 9034
CALL COMLIN(3,CLINE,N1,N2,EFLAG)
IF (N1 .LE. 0) EFLAG = .TRUE.

```

```

      IF (N1 .GE. EOF) EFLAG = .TRUE.
      IF (N2 .GE. EOF) N2 = EOF - 1
9034 CONTINUE
      IF (.NOT.(EFLAG) ) GO TO 9036
      ERRCT = EPRCT + 1
      WRITE (OUT,2100)
      GO TO 9037
9036 CONTINUE
      ERRCT = 0
C      READ IN TWO STRINGS; PROMPT IF NECESSARY
      IF (.NOT. MFLAG) WRITE (OUT,2230)
      CALL GETLIN(STR1,NC1)
      IF (NC1 .LE. 0) EFLAG = .TRUE.
      IF (.NOT. MFLAG) WRITE (OUT,2240)
      CALL GETLIN(STR2,NC2)
      IF (.NOT.(EFLAG) ) GO TO 9038
      ERRCT = ERRCT + 1
      WRITE (OUT,2100)
      RETURN
9038 CONTINUE
C      NOW FIND STRING1
      FOUND = .FALSE.
      DO 50 K = N1,N2
      CALL MEMORY(FETCH,LINE,LPTR(K))
      CALL SEARCH(LINE,STR1,NC1,MATCH,MCI)
C      IF (.NOT.(MATCH) ) GO TO 9040
      NOW MAKE SUBSTITUTION
      J = MCI
C      FOUND = .TRUE.
      DELETE STRING1
      DO 20 I = 1,NC1
      DO 10 M = J,79
      LINE(M) = LINE(M+1)
      10 CONTINUE
      20 CONTINUE
C      NOW MAKE ROOM FOR STRING2
      IF (.NOT.(NC2 .GT. 0) ) GO TO 9042
      DO 40 L = 1,NC2
      M = 81 - J
      DO 30 I = 2,M
      LINE(82-I) = LINE(81-I)
      30 CONTINUE
      40 CONTINUE
C      NOW INSERT NEW STRING
      DO 45 I = 1,NC2
      LINE(J+I-1) = STR2(I)
      45 CONTINUE
9042 CONTINUE
C      STORE REVISED LINE
      CALL MEMORY(STORE,LINE,LPTR(K))
C      DISPLAY REVISED LINE
      WRITE (OUT,2110) K,LINE
C      REMOVE "C" IN CC 1 OF ABOVE LINE TO ENABLE
C      DISPLAY OF EACH LINE IN WHICH A STRING HAS BEEN
C      REPLACED

```

```

          CURLIN = K
9040  CONTINUE
      50  CONTINUE
          IF (.NOT. FOUND) WRITE (OUT,2250)
9037  CONTINUE
      RETURN
      END
      SUBROUTINE CT

```

```

C
C
C
PART OF SLED PACKAGE
CHANGES THE MESSAGE TERMINATOR TO ANY VALID CHARACTER

```

```

COMMON /BLK1/ INT,OUT /BLK4/ TCHAR /BLK5/ MFLAG,ERRCT,CURLIN
INTEGER IN,OUT,ERRCT,CURLIN,NC
INTEGER*2 TCHAR,INLIN,BLNK
LOGICAL MFLAG
DIMENSION INLIN(80)
DATA BLNK/' '/

```

```

2100  FORMAT (' -INVALID COMMAND-')
2200  FORMAT (' TERMINATOR?>')

```

```

C
C
      IF (.NOT.(.NOT. MFLAG) ) GO TO 9044
          ISSUE PROMPT
          WRITE (OUT,2200)

```

```

9044  CONTINUE
      CALL GETLIN(INLIN,NC)
      IF (.NOT.((NC.EQ.0).OR.(INLIN(1).EQ.BLNK)) ) GO TO 9046
          ERRCT = ERRCT + 1
          WRITE (OUT,2100)
          GO TO 9047

```

```

9046  CONTINUE
      TCHAR = INLIN(1)

```

```

9047  CONTINUE
      RETURN
      END
      SUBROUTINE MENU

```

```

C
C
C
PART OF SLED PACKAGE
PROVIDES USER WITH A SUMMARY OF AVAILABLE COMMANDS
AND THEIR FORMATS.

```

```

COMMON /BLK1/ IN,OUT
INTEGER IN,OUT
200  FORMAT (' SLED COMMAND SUMMARY:''' LINE/TEXT INSERT',T38,' STRING
* REPLACEMENT'/3X,'ALN',T10,' INSERT <A>FTER <L>INE N',T40,'RS&P&Q&
*',T48,'<R>EPLACE <S>TRING',/3X,'RLN',T10,' <R>EPLACE <L>INE N .OR.
*',T40,'RSN&P&Q&',T50,' "P" WITH "Q" IN'/ 3X,'RLN',M',T15,' LINES N TH
*RU M',T40,'RSN',M&P&Q&',T52,' INDICATED LINES.'/ OUTPUT COMMANDS',
*T38,' STRING SEARCH'/ 3X,'L',T10,' DISPLAY CURRENT <L>INE',T40,'DS&P
*',T48,' <D>ISPLAY LINES '/3X,'LN',T10,' OR LINE N.',T50,' WITH <S>
*TRING "P"',/3X,'LN',M',T10,' LINES N THRU M',T40,'DSN',M&P&Q&',T48,'OR
* SHOW ANY LINES')
201  FORMAT (3X,'S(',T10,'<S>HOW A ', '"SCREEN" OF LINES',T50,'N-M CONTA
*INING "P"'/3X,'SN',T10,' SHOW A SCREEN FROM LINE N',T38,'CONT?OL C
*OMMANDS'/ 3X,'M',T10,' SHOW COMMAND <M>ENU (THIS)',T40,'?',T48,' <Q

```

```

* > OPEN A FILE OR '/3X,'V',T10,'SHOW <V>ERSION INFORMATION',T52,'CREA
* TE A FILE FOR EDITING'/T40,'CT <C>HANGE THE LOGICAL'/5X,'TO <D>U
* IT THE EDIT TYPE "<RET>"',T40,'MESSAGE <T>ERMIN', 'ATOR')
WRITE (OUT,200)
WRITE (OUT,201)
RETURN
END
SUBROUTINE VERS

```

C  
C  
C

PART OF SLED PACKAGE

COMMON /BLK1/ IN,OUT

INTEGER IN,OUT

```

220 FORMAT (' SLED VERSION FORT1.1 NPS MONTEREY 300401'// ' LOCAL EXPER
* T IS C. TAYLOR 408-646-2691 0800-1700 "ST/PDT'// ' LINE DELETE KEY
* IS < > (ASCII) OR <CENT SIGN> ', '(EBCDIC)'/ ' CHARACTER DELETE K
* EY IS <D>'// ' EDITOR LOGICAL MESSAGE TERMINATORS ARE:'// ' (1)
* <RETURN> AND (2) <S>'// ' AND CAN BE CHANGED TO ANY STANDARD
* FORTRAN CHARACTER.'// ' ALL INPUT IS TRANSLATED TO UPPER CASE.'// '
* THE FOLLOWING DEVIATIONS FROM SLED STANDARD WERE REQUIRED:')
221 FORMAT (' (1) THE UNIVERSAL ENTRY COMMAND "SLED" INVOKES INSTRU
* TIONS'// ' FOR A NON-STANDARD ENTRY: "SLED1 <FILENAME> <FILET
* YPE>"// ' (2) ONLY ONE FILE PER SESSION CAN BE OPENED.'// ' (
* 3) MAXIMUM FILESIZE IS 4000 LINES.'// ' (4) THE USER IS ASKED TO
* INDICATE WHETHER HE IS EDITING A'// ' NEW FILE IN ORDER TO PR
* EVENT A DISK READ ERROR IN FORTRAN 4.'// ' (5) WHEN <RETURN> IS USED
* AS A LOGICAL MESSAGE'// ' TERMINATOR, THE LINE OR STRING IS
* PADDED WITH BLANKS ON'// ' THE RIGHT. THIS AFFECTS THE RS F
* UNCTION ONLY.')

```

```

222 FORMAT (' (6) ONLY THE FIRST OCCURRENCE OF A STRING IN EACH LINE
* '/ ' IS REPLACED TO PERMIT FREE SUBSTITUTIONS OF BLANKS')
WRITE (OUT,220)
WRITE (OUT,221)
WRITE (OUT,222)
RETURN
END
SUBROUTINE OPEN

```

C  
C  
C  
C

OPENS TEXT FILE AND WORKSPACE FILE

READS TEXT FILE INTO WORKSPACE IF IT ALREADY EXISTS

INITIALIZES POINTERS ETC.

```

COMMON /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK3/ TFILE /BLK5/ MF
* LAG,ERRCT,CURLIN /BLK6/ STACK,STKPTR
INTEGER IN,OUT,TFILE,LINE,ERRCT,CURLIN,STORE,MAXLIN,EOF, STKPTR,I,
* NC

```

INTEGER\*2 LPTR,STACK,FNAME,INLIN,YES,NO,REPLY,BLINE

LOGICAL MFLAG

DIMENSION LPTR(4000),BLINE(80),STACK(4000),FNAME(80),INLIN(80)

DATA YES/'Y'//,BLINE/80\*' '//,NO/'N'//,STORE/1/

1000 FORMAT (80A1)

2040 FORMAT (' -',I4,' LINES IN FILE: ',80A1)

2050 FORMAT (' -CREATING FILE: ',80A1)

2400 FORMAT (' FILENAME?>')

2410 FORMAT (' IS THIS A NEW FILE?>')

```

2420 FORMAT (' -MAX CAPACITY 4000 LINES EXCEEDED-')
C
C   INITIALIZE
MAXLIN = 4000
CURLIN = 1
C   READ IN FILENAME (COSMETIC)
IF (.NOT. MFLAG) WRITE (OUT,2400)
CALL GETLIN(FNAME,NC)
C   ASK WHETHER IT IS A NEW FILE (TO PREVENT FORTRAN READ ERROR)
5   WRITE (OUT,2410)
READ (IN,1000) INLIN
REPLY = INLIN(1)
IF ((REPLY.NE.YES).AND.(REPLY.NE.NO)) GO TO 5
IF (.NOT.(REPLY.EQ.YES) ) GO TO 9048
WRITE (OUT,2050) FNAME
EOF = 1
STKPTR = 1
C   ACTIVATE FILE WITH AN ACCESS
LPTR(1) = 1
CALL MEMORY(STORE,BLINE,LPTR(1))
GO TO 9049
9048 CONTINUE
C   NOW READ IN TEXT FILE
LINE = 0
9050 IF (.NOT. (.TRUE.)) GO TO 9051
READ (TFILE,1000,END=10) INLIN
LPTR(LINE+1) = LINE + 1
CALL MEMORY(STORE,INLIN,LPTR(LINE+1))
LINE = LINE + 1
GO TO 9050
9051 CONTINUE
10  CONTINUE
IF (.NOT.(LINE.GE.MAXLIN) ) GO TO 9052
WRITE (OUT,2420)
STOP
9052 CONTINUE
STKPTR = LINE + 1
EOF = STKPTR
TELL USER FILE OPEN
WRITE (OUT,2040) LINE,FNAME
9049 CONTINUE
DO 20 I = 1,MAXLIN
STACK(I) = 1
20  CONTINUE
RETURN
END
SUBROUTINE QUIT

PART OF THE SLED PACKAGE
CLOSES OUT THE WORK FILE AND WRITES THE NEW OR UPDATED
TEXT FILE

COMMON /BLK2/ LPTR,MAXLIN,EOF /BLK3/ TFILE /BLK1/ IN,OUT
INTEGER MAXLIN,IN,OUT,EOF,TFILE,L,LIMIT
INTEGER*2 LINE,LPTR

```

```

DIMENSION LPTR(4000),LINE(80)
2000 FORMAT (30A1)
2450 FORMAT ('-',14,' LINES WRITTEN-')
C
REWIND TFILE
LIMIT = EOF - 1
DO 90 L = 1,LIMIT
CALL MEMORY(FETCH,LINE,LPTR(L))
WRITE (TFILE,2000) LINE
90 CONTINUE
WRITE (OUT,2450) LIMIT
RETURN
END
SUBROUTINE MEMORY(ACTION,LINE,PTR2)
C
C PART OF SLED PACKAGE
C HANDLES ALL MEMORY REFERENCES USING DIRECT-ACCESS DISK FILE
C CURRENT CAPACITY IS 4000 LINES
C REQUIRES AT LEAST 3 DEDICATED CYLINDERS OF DISK SPACE FOR
C WORK FILE UNDER CP/CMS ON AN IBM 360/67
C
COMMON /BLK3/ TFILE
INTEGER WFILE,TFILE,ACTION,STORE,PTR,AVAR,ERRS
INTEGER*2 LINE,PTR2
DIMENSION LINE(80)
DATA STORE/1/
1000 FORMAT (30A1)
C
C DEFINE WORK FILE
WFILE = 13
DEFINE FILE 13(4000,80,E,AVAR)
C CONVERT PTR2 FROM INTEGER*2 TO INTEGER
PTR = PTR2
C INITIALIZE READ ERROR COUNTER AND BEGIN
ERRS = 0
IF (.NOT.(ACTION .EQ. STORE) ) GO TO 9054
WRITE (WFILE,PTR,1000) LINE
GO TO 9055
9054 CONTINUE
C
C FETCH
5 READ (WFILE,PTR,1000,ERR=99) LINE
9055 CONTINUE
RETURN
99 ERRS = ERRS + 1
IF (ERRS .LT. 10) GO TO 5
STOP
END
SUBROUTINE INPUT
C
C IMPLEMENTS THE INPUT MODE
C
COMMON /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK5/ MFLAG,ERRCT,CU
*LIN
INTEGER*2 PD,LPTR,BLNK,OUTLIN
INTEGER MAXLIN,EOF,ERRCT,CURLIN,STORE,I,J,IN,OUT,NC

```

```

LOGICAL MFLAG
DIMENSION LPTR(4000),OUTLIN(80)
DATA PD/'.'/,STOPE/1/,BLNK/' '/
2110 FORMAT (' I>')
C IF NO INPUT IN QUEUE, PROMPT USER
IF (.NOT.MFLAG) WRITE (OUT,2110)
CALL GETLIN(OUTLIN,NC)
9056 IF (.NOT.(.NOT.((OUTLIN(1).EQ.PD).AND.(OUTLIN(2).EQ.BLNK)))) GO
*TO 9057
IF (.NOT.(NC .GT. 0) ) GO TO 9058
UNLESS IT WAS A NULL LINE
MAKE ROOM FOR NEW INPUT
IF (.NOT.(CURLIN.LT.EOF) ) GO TO 9060
J = EOF - CURLIN
DO 10 I = 1,J
LPTR(EOF + 1 - I) = LPTR(EOF - I)
10 CONTINUE
GO TO 9061
9060 CONTINUE
CURLIN = EOF
KEEPS INPUT TEXT CONTIGUOUS
9061 CONTINUE
EOF = EOF + 1
GET A NUMBER FOR NEW LINE FROM STACK
CALL POP(LPTR(CURLIN))
NOW STORE THE NEW LINE
CALL MEMORY(STORE,OUTLIN,LPTR(CURLIN))
CURLIN = CURLIN + 1
9058 CONTINUE
IF NOTHING IN QUEUE, PROMPT USER
IF (.NOT.MFLAG) WRITE (OUT,2110)
CALL GETLIN(OUTLIN,NC)
GO TO 9056
9057 CONTINUE
RETURN
END

```

## SUBROUTINE GETLIN(OUTLIN,NC)

GETS A LINE FROM TERMINAL; QUEUES UP MULTIPLE LINES

```

COMMON /BLK1/ IN,OUT /BLK4/ TCHAR /BLK5/ MFLAG,ERRCT,CURLIN
INTEGER*2 INLIN,OUTLIN,QUEUE,BLNK,TCHAR
INTEGER IN,OUT,ERRCT,CURLIN,I,J,K,LINELN,BQ,ENDQ,NC,NCHARS
LOGICAL MFLAG,NFLAG
DIMENSION INLIN(80),OUTLIN(80),QUEUE(80,10),NCHARS(10)
DATA BLNK/'.'/,LINELN/80/,BQ/0/,ENDQ/0/
1010 FORMAT (30A1)
2060 FORMAT (' -TRUNCATED; ONLY 10 ITEMS PER LINE-')
2070 FORMAT (' -ILLEGAL CHARACTER OR BLANK COMMAND-')
C MFLAG GOES TRUE WHEN MULTIPLE INPUT LINES ARE STACKED
IF (.NOT.(.NOT.MFLAG) ) GO TO 9062
READ (IN,1010,ERR=99,END=98) INLIN

```

```

I = 1
9064 IF (.NOT. ((I.LE.LINELN).AND.(INLIN(I).NE.TCHAR)) ) GO TO 9065
      OUTLIN(I) = INLIN(I)
      I = I + 1
      GO TO 9064
9065 CONTINUE
      NC = I - 1
      IF (INLIN(I).EQ.TCHAR) MFLAG = .TRUE.
      IF (.NOT.(I.LE.LINELN) ) GO TO 9066
      DO 20 K = I,LINELN
        OUTLIN(K) = BLNK
      CONTINUE
20 9066 CONTINUE
9068 IF (.NOT. (INLIN(I).EQ.TCHAR) ) GO TO 9069
      IF (.NOT.(ENDQ.GE.10) ) GO TO 9070
      WRITE (OUT,2060)
      INLIN(I) = BLNK
      GO TO 9071
9070 CONTINUE
      ENDQ = ENDQ + 1
      I = I + 1
      J = 1
      MFLAG = .TRUE.
9072 IF (.NOT. ((I.LE.LINELN).AND.(INLIN(I).NE.TCHAR)) ) GO TO
* 9073
      QUEUE(J,ENDQ) = INLIN(I)
      IF (INLIN(I).VE.BLNK) MFLAG = .FALSE.
      I = I + 1
      J = J + 1
      GO TO 9072
9073 CONTINUE
      NCHARS(ENDQ) = J - 1
      IF((I.GT.LINELN).AND.MFLAG) NCHARS(ENDQ)=0
      IF (.NOT.(J.LE.LINELN) ) GO TO 9074
      DO 30 K = J,LINELN
        QUEUE(K,ENDQ) = BLNK
      CONTINUE
30 9074 CONTINUE
9071 CONTINUE
      GO TO 9068
9069 CONTINUE
      GO TO 9063
9062 CONTINUE
C GET LINE FROM QUEUE INSTEAD
      BQ = BQ + 1
      NC = NCHARS(BQ)
      DO 40 I = 1,LINELN
        OUTLIN(I) = QUEUE(I,BQ)
      CONTINUE
40 IF (.NOT.(BQ.EQ.ENDQ) ) GO TO 9076
      BQ = 0
      ENDQ = 0
      MFLAG = .FALSE.
9076 CONTINUE
9063 CONTINUE

```



```

RETURN
98 CONTINUE
REWIND IN
99 CONTINUE
WRITE (OUT,2070)
OUTLIN(1) = BLNK
RETURN
END

```

## SUBROUTINE PUSH(X)

PUSHES A POINTER TO A FREE LINE INTO THE STACK

```

COMMON /BLK1/ IN,OUT /BLK6/ STACK,STKPTR
INTEGER STKPTR,IN,OUT
INTEGER*2 STACK,X
DIMENSION STACK(4000)
2080 FORMAT (' -FREE LINE LIST STACK OVERFLOW-')

```

```

IF (.NOT.(STKPTR.GT.1) ) GO TO 9078
STKPTR = STKPTR - 1
STACK(STKPTR) = X
GO TO 9079

```

```

9078 CONTINUE
STACK OVERFLOW
WRITE (OUT,2080)

```

```

9079 CONTINUE
RETURN
END

```

## SUBROUTINE POP(X)

POPS A POINTER TO A FREE LINE FROM THE STACK

```

COMMON /BLK1/ IN,OUT /BLK2/ LPTR,MAXLIN,EOF /BLK6/ STACK,STKPTR
INTEGER STKPTR,MAXLIN,EOF,IN,OUT
INTEGER*2 STACK,LPTR,X
DIMENSION STACK(4000),LPTR(4000)
2090 FORMAT (' -ALL SYSTEM BUFFERS FULL-')
X = STACK(STKPTR)

```

```

IF (.NOT.(STKPTR.LT. MAXLIN) ) GO TO 9080
STKPTR = STKPTR + 1
GO TO 9081

```

```

9080 CONTINUE
WRITE (OUT,2090)

```

```

9081 CONTINUE
RETURN
END

```

## SUBROUTINE CNVRT(STRING,I,J,N)

CONVERTS CHARACTERS I THROUGH J OF STRING INTO AN INTEGER N

```

C
  INTEGER*2 STRING,DIGIT
  INTEGER I,J,N,K,L
  DIMENSION STRING(80),DIGIT(10)
  DATA DIGIT/'0','1','2','3','4','5','6','7','8','9'/
  N = 0
  DO 20 K = I,J
    L = 1
9082 IF (.NOT. (STRING(K).NE.DIGIT(L))) GO TO 9083
    L = L + 1
    GO TO 9082
9083 CONTINUE
    IF (.NOT. (L .LE. 10)) GO TO 9084
    N = N + (L-1)*(10**(J-K))
    GO TO 9085
9084 CONTINUE
    N = -99999999
    RETURN
9085 CONTINUE
20 CONTINUE
  RETURN
  END

```

```

SUBROUTINE COMLIN(C1,CLINE,N1,N2,EFLAG)

```

```

C
C
C FINDS AND INTERPRETS THE LINE NUMBERS CONTAINED ON A
C COMMAND LINE. CHECKS FOR ERRORS.

```

```

C
  INTEGER C1,N1,N2,I,J
  INTEGER*2 CLINE,BLNK,COMMA
  LOGICAL EFLAG
  DIMENSION CLINE(80)
  DATA BLNK/' ','/','COMMA','/'
  EFLAG = .FALSE.
  FIND FIRST DIGIT
  I = C1
  J = I
9086 IF (.NOT. ((CLINE(J).NE.BLNK).AND.(CLINE(J).NE.COMMA))) GO TO 9087
  *7
  J = J + 1
  GO TO 9086
9087 CONTINUE
  IF (.NOT.(J.GE.80)) GO TO 9088
  EFLAG = .TRUE.
  GO TO 9089
9088 CONTINUE
C CONVERT FIRST NUMBER TO AN INTEGER
  CALL CNVRT(CLINE,I,J-1,N1)
C LOOK FOR SECOND NUMBER
  I = J + 1
  J = I
9090 IF (.NOT. (CLINE(J).NE.BLNK)) GO TO 9091
  J = J + 1
  GO TO 9090

```

```

9091 CONTINUE
    IF (.NOT.(J .GE. 80) ) GO TO 9092
        EFLAG = .TRUE.
        GO TO 9093
9092 CONTINUE
    IF (.NOT.(I .EQ. J) ) GO TO 9094
        NO SECOND NUMBER EXISTS
        N2 = N1
        GO TO 9095
9094 CONTINUE
    CONVERT SECOND NUMBER
    CALL CNVRT (CLINE,I,J-1,N2)
9095 CONTINUE
    IF (N1 .GT. N2) EFLAG = .TRUE.
9093 CONTINUE
9089 CONTINUE
    RETURN
    END
    SUBROUTINE SEARCH(LINE,STRING,NC,MATCH,MCI)
C
C PART OF SLED PACKAGE
C SEARCHES 'LINE' FOR THE FIRST OCCURRENCE OF 'STRING'.
C 'MATCH' IS SET TO '.TRUE.' IF A MATCH IS FOUND.
C 'NC' IS THE NUMBER OF CHARACTERS IN 'STRING' (REQUIRED INPUT)
C 'MCI' IS AN OUTPUT INDICATING FIRST COL OF MATCH
C
    INTEGER I,J,L,NC,MCI
    INTEGER*2 LINE,STRING
    LOGICAL MATCH
    DIMENSION LINE(80),STRING(80)
C
    J = 1
    MATCH = .FALSE.
9096 IF (.NOT. ((.NOT.MATCH).AND.(J.LE.81-NC)) ) GO TO 9097
9098 IF (.NOT. ((STRING(1).NE.LINE(J)).AND.(J.LE.81-NC)) ) GO TO 909
*9
        J = J + 1
        GO TO 9098
9099 CONTINUE
    IF (.NOT.(J.LE.81-NC) ) GO TO 9100
        I = 1
        L = J
9102 IF (.NOT. ((STRING(I+1).EQ.LINE(L+1)) .AND. ((L+1).LT.80).AN
*0.(I+1.LE.NC)) ) GO TO 9103
        L = L + 1
        I = I + 1
        GO TO 9102
9103 CONTINUE
    IF (.NOT.(I .EQ. NC) ) GO TO 9104
        MATCH = .TRUE.
        GO TO 9105
9104 CONTINUE
        J = J + 1
9105 CONTINUE
9100 CONTINUE

```

FILE: SLED2      FORTRAN   T1

NAVAL POSTGRADUATE SCHOOL

```
          GO TO 9096
9097 CONTINUE
      MC1 = J
      RETURN
      END
```

Appendix B  
SLED PASCAL Implementation  
(by R. Burnham, R. Coulter, and S. Smart)  
CONCEPTS

The purpose of this programming project was to implement a simple text editor to run under standard PASCAL as defined in Wirth [1972]. The specifications for the program are fairly extensive and seek to define the program in specific enough terms to ensure portability. In designing and implementing this program, the following two goals were utilized:

a. PORTABILITY. The finished program should be capable of running under any implementation of standard PASCAL.

b. STANDARDIZATION. The finished program should abide by the detailed specifications provided for the user interaction with any implementation dependent features fully documented to facilitate use by both inexperienced and experienced users.

SYSTEM DESIGN

The overall design for the text editor was heavily influenced by the strict requirements of the specification document. This specification delineated the commands that were to be implemented and their format. The primary design task involved creating an efficient system which included the required commands in an implementation independent program.

FILE MANAGEMENT. The primary purpose of any text editor is to create and modify text (character) files in an interactive manner. This problem can be separated into several functional areas. The first of these is file manipulation and management. In as much as PASCAL was designed primarily as a pedagogical aid, the language lacks extensive input/output operations. This in turn allows the various implementations to define these operations. Since this would necessarily result in operations which were not portable, it was decided to design the program to meet the requirement that the user be able to access external text files from within the program and that the program not fail if the user attempted to access a non-existent file.

The Berkeley Pascal implementation for the UNIX operating system (which was used for this effort) defines three types of files, in addition to the standard input and output files. The first of these concerns explicit naming. In this case, the file name is placed in the program heading and acts as a passing "parameter" from the UNIX operating system into the program. The file so named must exist as a UNIX

file.

The second type is an implicitly defined file. These files are declared in variable declaration sections of program blocks and have scope in the same manner as variables. When a block is entered, the file is created with the UNIX filename tmp.x where x is an integer representing the chronological order in which the file is used. When the block is exited, the file is destroyed.

The third type of file uses a dummy file name convention. The file name is declared in the variable declaration section but can be equivalenced to an existing file by the system functions reset and rewrite. These functions create a UNIX path between the dummy file name and the actual UNIX name, which may be supplied during execution. In the case of rewrite, if no UNIX file exists, it is created.

The dummy file name seemed ideally suited to the program requirement that the user be able to create and access files at will. However, it is necessary to know whether the file which is to be opened has been previously created. Since it is impossible for the program to access the UNIX user's directory to determine if files exist, it was decided to create a SLED directory containing the file names and sizes of all files created in the SLED environment. In the event that the user desired to edit a file which existed in his UNIX directory but not in the SLED directory, the SLED directory could be edited to include this filename. To implement this feature, it was decided to explicitly name this directory <directory> as a UNIX file. Any additional files needed as temporary storage locations to be utilized while a file was being edited could then be implemented as implicitly named files, since their existence is not important to the user (unless the amount of file space allocated to the user by the operating system is limited).

TEXT MANIPULATION. As a text editor, SLED has to carry out two basic functions. The editor must insert and delete lines of text in the file, and must search lines for pattern matching and replacement. These functions are related and are the dominant factor in the choice of an effective data structure.

PASCAL has several data structure constructors in the language which can be used to fulfil these tasks. These include the linear array, record, and pointer. The salient features of these constructors in regards to the tasks involved will now be discussed.

The PASCAL array is similar to arrays in other languages with

the exception that the elements of the array may be complex data types such as records. Since the array must be statically defined, the storage can be highly efficient. Lines of text can be stored as character arrays. This has the advantage that locating a given line or character can be accomplished by simply subscripting a variable. In addition, overhead is at a minimum since no pointers, links or other devices are required. The array suffers from the disadvantage that insertions and deletions are expensive as they require copying on the average half of the array. Furthermore, since the array must be defined statically, it is likely that much of the array will be empty at any one time.

The record data structure is similar to the array except that the elements of the record need not be of the same data type. By itself, the record offers no advantages as compared to the array. However, the record fields can be used to act as pointers or links to other records thus allowing the creation of lists or trees. Trees offer the advantage that sorting, inserting, and deleting can be carried out quite efficiently. In addition, searching is easier and more efficient than with linked lists (although not as efficiently as an array). The major disadvantage of the tree is the large amount of overhead required since each interior node must contain a link to each descendant. The linked list can be considered as a compromise of the tree structure. Insertions and deletions are still efficient, but searching requires following a string of pointers through the list. Since only one pointer is required for each node, the amount of overhead is approximately halved compared to the tree.

The pointer type represents a method of dynamic allocation of records to a linked list or tree structure. This offers the advantage that space need not be allocated until actually required. Unfortunately, the methods for allocating and de-allocating memory space via pointers is poorly defined in the language, resulting in implementation dependent designs. In particular, standard PASCAL allows pointers to records to be destroyed resulting in the creation of garbage. No garbage collection is carried out by the language to recover this memory. Therefore, a common technique is to place unused records into a "free" list. This, however, defeats the idea of dynamic allocation.

Based on these considerations, it was decided that lines within the text file would be treated as a linked list. This would facilitate the line append and line replace operations. The overhead for this structure would then be one pointer per line, which was not considered excessive. Rather than depend on the pointer type to create and manage list elements, it was decided that the list would consist of an array of line records, with each record consisting of a pointer to the next line and the contents of the line.

In representing the characters of a given line, it was necessary to decide between using another linked list for elements of a line or a character array. Again, the linked list would make character insertions

and deletions efficient. Since this would require a pointer for each character, about half of the memory space allocated would be overhead. A possible compromise would be to have each list node consist of several characters. This would create difficulties in insertion and deletion and would require a complicated algorithm to implement. It was decided to represent the line as a character array. This had the benefit of making the pattern matching algorithm easier to implement as well as reducing overhead.

PARAMETERIZATION. To allow for adaptations of the program to other systems, the parameters for the data structure are defined in a constant declaration block in the main program. This allows implementations to scale the size of the data structure to the amount of memory available. To further enhance portability, it was decided to localize the input/output procedures in separate routines which could be replaced when implementing the system on other machines.

## IMPLEMENTATION

The linked line list was implemented as an array of line records named <buff>. Each line record consists of an integer pointer to the array element (record) of the next line and a 120 character packed array. This size allows the creation of a line which will cover the linesize of most standard output devices. In addition, a separate record, <head>, serves as a pointer into the line list and contains the number of the first line presently in the buffer.

GENERAL STRUCTURE OF SLED. The editor basically has five categories of text processing procedures. The first of these are the control commands. There are three types of control commands: a change of logical message terminator so that the user may select the symbol or character he desires to indicate an end of a line or command, a command to exit the editor mode which will write the text file to the user's file as well as terminate the program, and a command to open a file for the user, either a new file or an existing file from his directory and close any previously opened file. As discussed in the section on design, this was implemented as a separate SLED directory. The contents of the directory consist of the UNIX file name along the total number of text lines in the file. In addition to this, a scratch file is maintained to allow updating of the directory contents.

To implement the logical terminator, it was decided to limit the terminators to printable characters. This allowed the terminator to serve as an end of line signal in the text buffer, eliminating the need for creating a separate list of line lengths or employing some other line length algorithm.

The second group of commands consists of those commands



concerned with output of the text file to the CRT scree. These commands are divided into those which display a specific portion of text and those which display large blocks of text. These commands, called output commands, consist of routines to display the current line, a specific line or a designated number of lines. The user optionally selects a from-line/to-line pair of numbers for display and defaults to the current line (defined as the last line displayed or last line operated upon). Another output command screens a large block of text for the user by using a from-line input. These display commands allow the user to edit large portions of his text. Two other commands, which do not process or handle text, and are considered output commands are a procedure to display a command menu to assist the user with SLED procedures and a display of the version listing for a more sophisticated user.

The third type of commands are those which handle insertion of text into the file. The line insertion commands cause the editor to enter the insert mode (all other procedures are in the edit mode). These commands allow insertion of new lines into the text as well as replacing a specific line or a group of lines in the text. In this way, the user can create or destroy portions of his text file by linking the new lines into the buffer list.

A fourth command searches the text for a particular character or string of characters and displays them to the user. Closely related to this is the command to replace these characters and strings in the body of the text, either in a specific line, a group of lines or throughout the entire text. These two types of commands along with the line insertion commands form the basis of the text processing procedures, while the output and control commands form the basis of the text handling procedures. To implement the pattern matching routine the Knuth, Morris, Pratt algorithm (as discussed in Knuth and elsewhere) was utilized. This algorithm uses the concept of a finite automation to determine how far to advance the pattern along the target line in the event of a mismatch between the pattern and its target. This is done by creating a table of edges which represent failure in the automaton. As an example, if the pattern consists of three identical letters and the first two match but the third one does not, instead of advancing the pattern by one position relative to the target the pattern can be moved three places since the first character cannot possibly match the third character of the target. The next table determines how far to advance the pattern if matching fails with the  $i$ th character of the pattern. In this way, no back-tracking in the target is required and the algorithm is  $O(n)$ . The diagram attached as Figure B1.1 shows the general scope of SLED as defined in the specification document. It basically shows the editor commands required by the system grouped into the five primary command areas; output, control, line insertion, string search and string replacement. The diagram also shows the different editor command modes.

SPECIFIC STRUCTURE OF SLED. Based on the general structure of SLED as proposed by the problem specification and as diagramed above,

the programming team made a detailed study of the basic routines needed, how these routines would interact and the data structures and file handling procedures that would be needed. The Figure B1.2 is a schematic of the implementation of SLED as described in this documentation. In implementing the SLED program, a top-down methodology was utilized in defining the program processes needed to meet the requirements stated above.

There are four general sections or levels to the program. The first level acts as a traffic controller for the entire program. It reads each of the user input commands and branches to the appropriate subroutine. The main program functions as this first level and screens the commands, eliminating the incorrect ones and processing the properly entered ones. It is the framework in which SLED performs its functions.

At this same level, the change terminator is located primarily because it does not handle the user data except to place the new terminator symbol in the text file (see procedure Changeterm documentation). It is properly classified as a special procedure in program control rather than text processing or text handling.

The second level of the program contains the bulk of the text processing procedures and consequently, the bulk of the coding. One subgroup contains the procedures which display the lines of text from the user's file. In many ways, it is similar to the output section outlined in the original evaluation. In addition to the screen line and display line procedures, we have included the string search procedure in this subgroup because it functions in a similar manner in that it is involved in the display of strings within the lines of text. This subgroup interfaces with a major subgroup of the third level, namely the commands which read the user's line number designations, translate them, and fetch the lines from the text file.

The second major subgroup of this level consists of the commands which handle the majority of the text insertions, deletions and string processing. These include appending lines, replacing lines and replacing or changing strings. These commands were grouped together due to their similarity of function and commonality of coding. They each have major subprocedures at this level and interface with the primary text handling procedures at the fourth level.

Also found at the second level are two other groups of procedures which are of less importance than the text processing procedures but are useful and necessary segments of the SLED program. The first of these are the control commands which open and close the file. They are obviously required file handling procedures and perform the functions normally expected of a text editor. They interface with key implementation dependent procedures at the third level.

The last major subgroup of the second level is the required

command menu and version document. The call to these procedures is rather simple and uncomplicated. Rather than place the documents in the PASCAL program, we decided to employ the existing UNIX directory to hold them. These files are explicitly named in the program as <menu> and <version>. The file contains the current command menu as well as the version and any changes to either of these to facilitate assisting the user can be made quickly and efficiently.

The third level of programming of SLED contains two subgroups, each of which are subroutines for major procedures in level two. The first subgroup are the routines which transform the user line number requests into from-line/to-line pairs and fetch the appropriate lines from the user's text. They are text handling commands and are part of the output section in the original specification.

The second subgroup interacts with the open and close file routines and are key text handling procedures. They are dependent upon the implementation of PASCAL in use on the computer system. The procedures utilize a directory file which, like the menu and version, is located in the UNIX directory.

The fourth level of SLED contains the key text handling commands to move data in and out of the buffer when required. All of the major procedures of SLED call the read buffer and write buffer routines to move through the user's file. These procedures are also implementation dependent.

A minor procedure of the program is also found at this level which causes the command menu to be printed when the user makes two consecutive errors, a requirement of the SLED specification.

#### TESTING AND EVALUATION

The constraints of time prohibited an exhaustive and thorough evaluation of SLED. There has, however, been extensive and continuous testing of the modules of SLED in the initial programming phases and as the program took its finished form. While not exhaustive the testing and evaluation performed by the programming team has resulted in a fully operational and effective editor.

Once the major operating bugs were identified and removed from the program, the task of specific debugging of each command and its interaction with the other commands of SLED was undertaken, including the testing of pathological errors where purposely erroneous and improper commands were input with the express purpose of causing the system to perform incorrectly or fail.

While we are satisfied that the program will function as required,

there is further room for testing of the system. The limited time available precluded the testing of large files and extensive directories and the actual production of useable and functional files. Besides the testing of large files, a period of time should be spent by disinterested parties (actual users) in using SLED to produce files and testing the system. From this evaluation, any remaining system bugs should be easily identified and corrected.

SLED - PASCAL

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

SLED

Programmed by: Robert M. Burnham  
Ronald J. Coulter  
Scott W. Smart

Naval Postgraduate School, Monterey, California

Specification: 20 February 1980

Written: 12 March 1980

Compiled: 14 March 1980

Source Computer: PDP 11-50

Object Computer: PDP 11-50

Language: PASCAL

Implementation: UC Berkeley PASCAL

File Location: UNIX PWB /work/cs500/smart/sled.p

Editor File Name: sled.p

Project Specification: Issued Separately

Abstract: SLED is a very simple general purpose text editor implemented in PASCAL and designed to be relatively transportable to other PASCAL systems. It performs a minimum of the usual text editing and display features found in a typical text editor.

```

*****
}
{***** BEGIN SLED *****}
{
    * DOCUMENTATION FOR THE OPERATION OF *
    * THE BODY OF THE MAIN PROGRAM CAN *
    * BE FOUND AT LINE 2376 *
}

program sled(input,menu,version,output,directory);

label 10,100;

const
    bufsize = 50;
    linesize = 120;
    nil = -1;
    namesize = 8;
    errmsg = 'INVALID COMMAND';
    blank = ' ';
    comma = ',';
    error = ' ** DATA ENTRY ERROR**PLEASE REENTER DATA ** ' ;

type
    line = record
        nextline : -1..bufsize;
        linestring : packed array[1..linesize] of char;
    end;
    buffer = array[1..bufsize] of line;
    patstring = packed array[1..linesize] of char;
    header = record
        firstline: integer;
        ptr : -1.. bufsize;
    end;

var
    letter, c, ch, ct : char ;
    errcnt, textsize, curline : integer ;
    menu, version, mfile, tempfile, directory, tempd : text ;
    buff : buffer;
    free : -1..bufsize;
    head : header;

```





```

(
*****
PROCEDURE WRITEBUF
*****

```

```

PURPOSE: This procedure writes the contents of the line
buffer to the currently open file. mfile is
a dummy file name. During execution, this
file name is replaced by a "path" to the
UNIX file name specified during a rewrite
or reset operation. File tempfile is a temporary
file used during read and write operations to
restore the user's UNIX file. The temp file
exists during execution as UNIX file tmp.2. If
execution terminates normally, this file is removed
from the system.

```

```

The procedure reads from the user's file (mfile)
to the temp file until the point where the buffer
is to be inserted is reached. At this point, the
contents of the buffer are written to the temp
file. After the buffer lines have been transferred,
the remaining lines of the user file are read and
written out to the temp file. The temp file now
contains the complete file. The entire temp file
is then read and written to the user's file.

```

```

VARIABLES: tempfile: scratch file
           mfile:   dummy name for user's UNIX file
           fname:   actual UNIX file name
           point:   pointer to the buffer

```

```

*****

```

```

procedure writebuf;
type pointer = integer;

var i : integer;
    ch : char;
    point : pointer;

begin

```

```

(
read all lines preceeding the first line of the buffer from
the user's file to the scratch file
)

```

```

begin
while not eoln(mfile) do
begin
read(mfile,ch);
write(tempfile,ch);
end;
end;

{
set the list pointer to the first element of the buffer
and read all lines in the list from the buffer to the scratch file
}

point := head.ptr;
while point <> nil do
begin
i := 1;
while (i < linesize) and (buff[point].linestring(i)
<> ct) do
begin
write(tempfile,buff[point].linestring(i));
i := i + 1;
end;
writeln(tempfile);
point := buff[point].nextline;
end;

{reset the buffer status record}

head.ptr := nil;
head.firstline := 0;
free := 1;
for i := 1 to hufsize - 1 do
buff[i].nextline := i + 1;
buff[bufsize].nextline := nil;

{
read past the lines of the user's file which were written to the
buffer previously
}

for i := 1 to 40 do
begin
while not eof(mfile) do
readln(mfile);
end;

```

{read all remaining lines from the user's file to the scratch file}

```
while not eof(mfile) do
  begin
  while not eoln(mfile) do
    begin
    read(mfile,ch);
    write(tempfile,ch);
    end;
  if not eof(mfile)
    then begin
      readln(mfile);
      writeln(tempfile);
    end;
  end;
```

{write the entire scratch file into the user's file}

```
rewrite(mfile,fname);
reset(tempfile);
while not eof(tempfile) do
  begin
  while not eoln(tempfile) do
    begin
    read(tempfile,ch);
    write(mfile,ch);
    end;
  if not eof(tempfile)
    then begin
      readln(tempfile);
      writeln(mfile);
    end;
  end;
end;

end; { writebuf }
```

PURPOSE: This procedure reads a block of 40 lines from a user file into the buffer. Mfile is a dummy file name which is replaced during execution by a "path" to a UNIX file. Strtline is the first line of the file to be placed in the buffer. This line and the next 39 (if they exist) are read from the user's file and linked into the list.

VARIABLES: mfile: dummy filename for user's text file  
 fname: actual UNIX file name  
 strtline: first line to be placed in buffer  
 textsize: total number of lines in user's file

\*\*\*\*\*

```
procedure readbuf(strtline : integer);
```

```
var ch : char;  

    i,k : integer;  

    numline : integer;
```

```
begin
```

```
{determine number of lines to be placed in buffer}
```

```
numline := 40;  

  if (textsize + 1 - strtline) < numline  

    then numline := textsize + 1 - strtline;
```

```
reset(mfile,fname);
```

```
for i := 1 to (strtline - 1) do  

  readln(mfile);
```

```
{ insert lines into buffer }
```

```
for i := 1 to numline do  

  begin  

    k := 1;  

    while not eoln(mfile) do  

      begin  

        read(mfile,ch);  

        buff[i].linestring[k] := ch;  

        k := k + 1;  

      end;
```

```

buff[i].linestring[k] := ct;
if i > 1 then buff[i-1].nextline := i;
readln(mfile);
end;

buff[numline].nextline := nil;
free := numline + 1;
for k := numline + 1 to bufsize - 1 do
  buff[k].nextline := k+1;
buff[bufsize].nextline := nil;

{update buffer status record}

head.ptr := 1;
head.firstline := strtline;

end ; ( readbuf )

```

**PURPOSE:** This procedure takes the number values produced by  
 the Lineget procedure and causes the appropriate number  
 of lines to be printed on the CRT screen. It is called by  
 those procedures which need to enter the users buffer  
 and extract part of the text. It, in turn, calls the procedures  
 Readbuf and Writebuf which are part of text-buffer  
 storage system. If the users request for text exceeds  
 the actual size of the text, this procedure will print  
 all the text that is available.

**VARIABLES:** The following variables are used in fetchline:  
 -----  
 x, p: counting numbers for iterative routines  
       pointer: number pointer to the next line  
       fline: from-line value  
       tline: to-line value  
 Global variables include:  
       textsize: the number of lines in the users text  
       curline: current line value  
       head.firstline: first line of the users text  
       head.ptr: pointer to the first line  
       buff[pointer].nextline: number value of the next  
                                   line in the buffer  
       buff[pointer].linestring[pl]: character value of the  
                                   line in the buffer

```

*****
}

```

```

procedure fetchline ( fline, tline : integer ) ;

```

```

var

```

```

    x,y, p, pointer : integer ;

```

```

begin

```

```

    if fline > textsize
    then

```

```

        fline := textsize ;
    if tline > textsize

```

```

then
    tline := textsize ;
    if fline < head.firstline
    then
        begin
            writebuf ;
            readbuf ( fline ) ;

            pointer := head.ptr ;
            end ;

            { searches for the from-line value
            in the users text. If not in the
            buffer, then the rest of the file
            is searched. }

            for x := head.firstline to ( fline - 1 ) do
            begin
                pointer := buff[pointer].nextline ;
                if pointer = nil
                then
                    begin
                        writebuf ;
                        readbuf ( x ) ;
                        pointer := head.ptr
                    end ;
            end;

            { print out each line, character by
            character, from the buffer to the
            CRT for the from-line/to-line values.
            If the buffer is exceeded, then the
            next block of text is read to the
            buffer. }

            for x := fline to tline do
                y := x;
                write ( ' ', y: 5, ' ' ) ;
                c := 1;
                while (buff[pointer].linestring

```



```
write( buff(pointer).linestring ),  
p := p + 1
```

```
end ;  
writeLn ;  
if x < tline then begin  
  pointer := buff(pointer).nextline ;  
  if pointer = nil  
  then
```

```
begin  
  writebuf ;  
  readbuf ( y ) ;  
  pointer := head.ptr  
end ;
```

```
end ; end ;
```

```
curline := tline ;  
end: (fetchline)  
  
      ( reset the value of the current line )
```

```

{
*****
PROCEDURE LINEGET
*****
PURPOSE: This procedure, called by some of the main procedures of
----- SLFD, reads the line number of the user input instructions,
constructs a " from-line/to-line " pair of variables and
checks for errors in user input. The user can designate the
current line with a carriage return or a change terminator
command, insert a value for any other line desired or
specify lines from one number to another.
The values produced by this procedure are passed back to
the calling command. This procedure is called by Displayline
and Screenline.

VARIABLES: The following local variables are used:
-----
line: the from-line value
toline: the to-line value
screencheck: boolean check value to detect an error
and signal the calling procedure to take specific
action
num: value of the first number read ( to-line value )
tnum: value of the second number read ( from-line )
temp: temporary variable for numbers
check: boolean checker for an end-of-line character
Global variable reference:
curline: current line
ct: change terminator character
errcnt: the current user error count for the
Errorroutine procedure
*****
}

procedure lineget ( var line,toline : integer; var screencheck : boolean ) ;

var
num, tnum, temp : integer ;
check : boolean ;

begin

```

```

screencheck := true ;
temp := 0 ;
line := curline ;
toline := line ;

begin
  if not eoln(input) then begin
    read (c) ;
    if c in ['0'..'9']
      then
        begin
          repeat
            if eoln (input)
              then
                temp := 10 * temp + ord (c) - ord ('0') ;
                num := temp ;
                check := true ;
            if not eoln(input) then
              read (c) ;
              until not ( c in ['0'..'9']) or ( check ) or ( c = ct )
                end ;
          if ( check ) or ( c = ct )
            then
              begin
                line := num ;
                toline := line ;
              end ;
            temp := 0 ;
          end ;
        end ;
      end ;
    end ;
  end ;

  if not (check) and ( c = comma )
    then
      begin
        if c = comma
          then
            { Reads in the second number
              and converts it to the to-line
              digit }

```

```

begin
line := num ;
if not ( eoln ( input ))
then
read ( c )

else
writeln(error) ;

if c in ['0'..'9']
then
begin
check := false ;
repeat
if eoln ( input )
then
temp := 10 * temp + ord (c) - ord ('0') ;
tnum := temp ;
check := true ;
until not ( c in ['0'..'9']) or ( check ) ;
read ( c ) ;
toline := tnum ;
end ;
end ;

if not ( c in ['0'..'9']) and ( c <> blank ) and not
( check ) and not ( c = ct )
then
begin
writeln(error) ;
errcnt := errcnt + 1 ;
line := curline ;
toline := line ;
screencheck := false ;
repeat
if not eoln ( input)

```

```

{ Error diagnostic for an improper
character or number sequence }

```

```
end ;
end ;
if line > toline
then
begin
writeLn(error) ;
writeLn(' Data is entered " fromliner toline" ');
line := curline ;
errcnt := errcnt + 1 ;
toline := line ;
end ;
errcnt := 0 ;
if line = 0
then
line := curline ;
end ;
end ; ( lineget )
```

```

{
*****
PROCEDURE DISPLAYLINE
*****
PURPOSE: This procedure displays lines of text from the users
----- file. The user requests the current line, a specific
line or a group of lines with a starting value and
an ending value. The input command is < L value(,value) >.
The number commands are read by calling Lineget and
the actual lines are fetched and printed by Fetchline.
This procedure is merely a vehicle for the interaction
of these two procedures.

VARIABLES: The following variables are used:
----- linefrom: from-line value
          lineto: to-line value
          check: error detecting variable
*****
}
procedure displayline ;
var
linefrom, lineto : integer ;
check : boolean ;
begin
lineget ( linefrom, lineto, check ) ;
if linefrom = 0 then linefrom := 1;
if textsize <> 0 then
fetchline ( linefrom, lineto )
else writeln('0 lines in file');
if eoln(linout) then begin
readln;
write('E>');
end;
end ; { displayline }

```

PURPOSE: This procedure displays 20 lines of text to the user. It can be started at the current line or at any line designated by the user. If the request exceeds the text size, then the screen will terminate with the last line of the text. The input command for displayline is < \$ value >. If improper data values are input, the checker will print only the current line with the error diagnostic printed by the Lineget procedure.  
 The procedure calls the procedures Lineget and Fetchline.

VARIABLES: The following local variables are used:  
 -----  
 linefrom: from-line value  
           lineto: to-line value  
 checker: boolean value passed by Lineget which causes only the current line to print instead of 20 lines. Done on error only  
 Global variable used:  
           curline: current line

```
*****  
}
```

```
procedure screenline ;
```

```
var
```

```
  linefrom, lineto : integer ;  
  checker : boolean ;
```

```
begin
```

```
  lineget ( linefrom, lineto, checker ) ;  
  if linefrom = 0
```

```
    then  
      linefrom := linefrom + 1 ;
```

```
  if linefrom <= lineto
```

```
    then  
      lineto := linefrom + 20 ;
```

```
  if checker = false  
    then
```

```
      ( Error routine for invalid  
        data in Lineget procedure )
```

```
begin
  linefrom := curline ;
  lineto := linefrom

  if textsize <> 0 then
    fetchline ( linefrom, lineto )
  else writeln('0 lines in file');
  if eoln(input) then begin
    readln;
    write('E>');
  end;

end ; { screenline }
```



**PURPOSE:** This procedure inserts lines into the buffer. The parameter strtline is the line which the inserted line(s) is to follow. If this line is not currently in the buffer, the contents of the buffer are written out and the buffer is relilled beginning with the line strtline. The procedure then continues to insert lines until the end of input symbol is reached. If the buffer is filled during this operation the contents of the buffer are written out and the last line inserted becomes the first (only) line in the buffer.

**VARIABLES:**

point: pointer to the line in the buffer the inserted lines are to follow  
 epoint: pointer to the line immediately following the lines inserted  
 hufline: counter to keep track of the line number which point is pointing to

\*\*\*\*\*

procedure appendline (var strtline : integer);

type pointer = -1..bufsize;

var text : packed array [1..linesize] of char;  
 point,epoint : pointer;  
 done : boolean;  
 i : 1..linesize;  
 bufline : integer;  
 inoch : char;

begin

```
{test if inserted lines are to be placed before the first line
of text. If so, pointer is null. If the file is empty the
first inserted line becomes the first line of text and the
buffer status is updated }
  if strtline = 0
  then begin
    if head.firstline > 1
    then begin
      writebuf;
```

```

    readbuf(1);
  end;
  if head.firstline = 0
    then begin head.ptr := nil;
      head.firstline := 1;
    end;
    epoint := head.ptr;
    point := nil;
  end

  {find the start line in the buffer}
  else begin
    if head.firstline > strtline
      then begin
        writebuf;
        readbuf(strtline);
        point := head.ptr;
      end
    else begin
      point := head.ptr;
      bufline := head.firstline;
      while bufline < strtline do
        begin
          point := buff(point).nextline;
          if point = nil
            then begin
              writebuf;
              readbuf(strtline);
              point := head.ptr;
              bufline := strtline;
            end
          else begin
            bufline := bufline + 1;
          end;
        end;
      end;
    end;

    {after the start line is found, set epoint to
    the next line}
    if buff(point).nextline <> nil then
      epoint := buff(point).nextline
    else epoint := nil;
  end;
  done := false;

```

while not done do

```
begin
  i := 1;
  if not eoln(input) then
    read(inpch)
  else inpch := ' ';
  text[i] := inpch;
  if inpch = '.' (check for end of input)
  then begin
    if not eoln(input)
    then begin
      read(inpch);
      i := i + 1;
      text[i] := inpch;
    end;
  end;

  {end of input. link epoint line to
  last inserted line}

  if (i = 1) or (inpch = ct)
  then begin
    if point <> nil
    then begin
      buff[point].nextline := epoint;
    end;
    done := true;
  end;
end;
```

{write text line into buffer}

```
if not done
then begin
  textsize := textsize + 1;
  while not eoln(input) and (inpch <> ct)
  and (i < linesize) do
    begin
      i := i + 1;
      read(inpch);
      text[i] := inpch;
    end;
  if eoln(input)
  then begin
```

```

readln;
write('>');
text[i + 1] := ct;
end;

{if no free lines available, write out
contents of buffer}

if free = nil
then begin
  if point <> nil then
    buff[point].nextline := epoint;
  writebuf;
  readbuf(strtline);
  point := buff[head.ptr].nextline;
  epoint := buff[point].nextline;
end;

if point <> nil
then buff[point].nextline := free
  else head.ptr := free;
point := free;
strtline := strtline + 1;
free := buff[free].nextline;
buff[point].linestring := text;
(update current line)
  curline := curline + 1;
end;

end;

end; ( appendline )

```

PURPOSE: This procedure serves two purposes. First it deletes all lines between the parameters strtline and endlne (inclusive). Next procedure calls procedure appendline allowing the user to add any lines in place of the deleted ones. If the lines to be deleted are not currently in the buffer, the buffer is written out and the first line to be deleted becomes the first line of the buffer.

VARIABLES:

point: points to the first line to be deleted  
 epoint: points to the line after the last line to be deleted  
 huflne: the line to which point is pointing

\*\*\*\*\*}

procedure replaceline(var strtline, endlne : integer);

type pointer = -1..bufsize;

var point, epoint : pointer;  
 huflne : integer;  
 temp : integer;

begin  
 {find strtline in buffer. If not in buffer write contents of buffer to output file and input 40 lines beginning with strtline.}

if head.firstline > strtline

then begin  
 writehuf;  
 readbuf(strtline);  
 point := head.ptr;  
 end

else begin  
 point := head.otr;  
 huflne := head.firstline;

while huflne < strtline -1 do

```

begin
point := buff[point].nextline;
if bufline < textsize then
if point = nil then
begin
writebuf;
readbuf(strtline);
point := head.ptr;
bufline := strtline;
end
else begin
bufline := bufline + 1;
end;
end;
end;
}
determine which lines are to be replace and link these lines to the
free list. If no new lines are to be added, reconnect the lines
in the buffer without the deleted lines. (i.e. connect strtline - 1
to endlne). If new lines are to be added, replace the strtline
with the first new line and append any following lines to it, then
reconnect the following lines beginning with endlne.
}
epoint := point;
for bufline := strtline - 1 to (endlne - 1) do
begin
epoint := buff[epoint].nextline;
if bufline < textsize then
if epoint = nil
then begin
buff[point].nextline := nil;
writebuf;
readbuf(bufline);
point := 0;
epoint := head.ptr;
end;
end;
}
{update the textsize and ouffer status record}
textsize := textsize - (endlne - strtline) - 1;
temp := buff[point].nextline;
buff[point].nextline := buff[epoint].nextline;
buff[epoint].nextline := free;
free := temp;
strtline := strtline - 1;
appendline(strtline)
end; { replaceline }

```

**PURPOSE:** This procedure searches the text between the parameters strtline and endlne for any lines containing an occurrence of the string <pattern>. If the string is found, the line containing it is displayed by calling procedure fetchline.

The procedure first computes the next table to implement the Knuth, Morris, Pratt string search algorithm. This table is then used in determining how far to move the pattern along the line of text in the event of a non-match.

**VARIABLES:**

next : next table  
 point: pointer to the textline currently being evaluated.  
 patlength: the length of the pattern

\*\*\*\*\*

```
procedure stringdisp(var strtline, endlne : integer; var
  pattern: natstring; var patlength: integer);
```

```
  type pointer = -1..bufsize;
```

```
  var
```

```
    i, j, buflne : integer ;
    next : array (1..linesize) of integer;
    point : pointer;
    text : packed array(1..linesize) of char;
    done : boolean;
```

```
begin
  {compute next table for string matching procedure }
```

```
  i := 0;
  next [1] := 0;
  j := 1;
  while j < patlength do
    begin
      done := false;
```

```

repeat
  if i > 0 then
    if pattern(i) <> pattern(j)
      then i := next(i)
      else done := true;
    until (i <= 0) or done;
    i := i + 1;
    j := j + 1;
    if pattern(i) = pattern(j)
      then next(j) := next(i)
      else next(j) := i;
    end;
  } find strline in the buffer }

if head.firstline > strline
  then begin
    writebuf;
    readbuf(strline);
    point := head.ptr;
  end
else begin
  point := head.ptr;
  bufline := head.firstline;
  while bufline < strline do
    begin
      point := buff(point).nextline;
    } if line is not in buffer, write out buffer
    and read in current line}
  if point = nil
    then begin
      writebuf;
      readbuf(strline);
      point := head.ptr;
      bufline := strline;
    end
  else begin
    bufline := bufline + 1;
  end;
end;

end;
while bufline <= endline do
  begin
    text := buff(point).linestring;
    i := 1;
    j := 1;

```



```

begin
  if pattern(i) = text(j)
  then begin
    i := i + 1;
    j := j + 1;
  end
  {keep matching}

  {match not found
  advance pattern
  as determined by
  next table}

  else begin
    if next(i) > 0
    then i := next(i)
    else begin
      i := 1;
      j := j + 1;
    end;
  end;

  end;

  if i > patlength then fetchline(bufline,bufline);
  point := buff[point].nextline;
  bufline := bufline + 1;
  if bufline < endline then
    if point = nil
    then begin
      writebuf;
      readbuf(bufline);
      point := head.ptr;
    end;
  end;

  end ; ( stringdiso )

```



```

if pattern [i] <> pattern[j] then i := next(i)
  else done := true;
until (i <= 0) or done;
  i := i + 1;
  j := j + 1;
if pattern[i] = pattern[j]
  then next(j) := next(i)
  else next(j) := i;
end;

{ find start line in buffer }

if head.firstline > strtline
  then begin
    writebuf;
    readbuf(strtline);
    point := head.ptr;
  end
  else begin
    point := head.firstline;
    while bufline < strtline do
      begin
        point := buff(point).nextline;
        if point = nil
          then begin
            writebuf;
            readbuf(strtline);
            point := head.ptr;
            bufline := strtline;
          end
          else begin
            bufline := bufline + 1;
          end
        end
      end;
end;

{ try to match pattern in text line }

while bufline <= endlinedo
  begin
    found := false;
    text := buff(point).linestring;
    i := 1;
    j := 1;
    temp := 1;
    temp2 := 1;
    while (i <= patlenath) and (j <= linesize)

```

```

and (text[j] <> ct) do
  becom
  if pattern[j] = text[j]
  then begin
    i := j + 1;
    j := j + 1;
    end
    else begin
      if next[i] > 0
      then i := next[i]
      else begin
        i := 1;
        j := j + 1;
        end;
      end;
    end;
  {pattern match found-replace pattern with
  string}

  if i > patlength
  then begin
    found := true;
    for k := temp2 to (j - (patlength + 1)) do
      begin
        buff[point].linestring[temp] := text[k];
        temp := temp + 1;
      end;
    m := 1;
    for k := (j - patlength) to ((j - patlength) +
      (strlenq - 1)) do
      begin
        if temp < linesize then
          buff[point].linestring[temp] := stringa[m];
          temp := temp + 1;
        end;
        temp2 := j;
        i := 1;
      end;
    {continue to search for pattern}
  end;
end;
if found then begin
  m := temp2;
  if temp < linesize then
    for k := temp to (temp + (j - temp2)) do
      begin
        if k < linesize then
          buff[point].linestring[k] := text[m];
          m := m + 1;
        end;
      end;

```

```
point := buff(point).nextline;
bufline := bufline + 1;
if bufline < endline
  then if point = nil
        then begin
              writebuf;
              readbuf(bufline);
              point := head.ptr;
            end;
        end;
      end;
end; (stringrep)
```

```

(
*****
PROCEDURE APPENDCOM
*****

```

PURPOSE: This procedure computes the start line for the insert procedure (appendline). If the line number is defaulted, the current line is used. If the line number exceeds the number of lines in the text, or is otherwise invalid, an appropriate error message is returned.

```

VARIABLES:
  lineno : start line for text insertion
  inv : true if invalid command
*****

```

```

procedure appendcom;
var com: char;
    lineno : integer;
    inv : boolean;
begin
  lineno := 0;
  com := ' ';
  inv := false;
  if eoln(input) or (com = ct) then if textsize > 0
    then lineno := curline;
  while not eoln(input) and (com <> ct) do
    begin
      read(com);
      if not (com in ('0'..'9') + [ct])
        then begin
          (compute line number)
          if not eoln(input) then repeat read(com) until eoln(input);
          writeln(errmsg0);
          errcnt := errcnt + 1;
          inv := true;
        end
      else if com <> ct then
        lineno := (10 * lineno) + ord(com) - ord('0');
    end;
  if not inv then
    if (textsize < lineno)
      then begin
        writeln(textsize:1, ' lines in file');
        if not eoln(input) then repeat read(com) until eoln(input);
      end
    end;

```

```
write('I>');  
end;  
appendline(lineno);  
errcnt := 0;  
end;  
  
if eoln(input)  
then begin  
  readln;  
  write('E>');  
end;  
curline := lineno;  
end; {appendcom}
```

```

{
*****
PROCEDURE REFLCON;
*****

```

PURPOSE: This procedure computes the start line and end line for the line delete procedure (replaceline). If the line number is defaulted, the current line is deleted. If the end line is not specified, the startline is deleted. If an invalid line number is inputted, an error message is returned. If the start line or end line is greater than the text size the last text line is deleted.

VARIABLES:

```

linest : start line for deletion
linend : end line for deletion
inv : true if invalid line number is inputted

```

```

*****

```

```

procedure reflcom;
var
com: char;
first : boolean;
linest, linend : integer;
inv : boolean;
begin
inv := false;
linest := 0;
linend := 0;
first := true;
com := ' ';
while not eoln(input) and (com <> ct) do
begin
readf(com);
if not (com in ('0'..'9') + [' ','ct'])
then begin
if not eoln(input) then repeat readf(com) until eoln(input);
writeLn('errmsg');
errcnt := errcnt + 1;
inv := true;
end;
else if com <> ct

```



```

else line1 := (l0*line1) + (ord(com) -
  ord('0'))
  else if com = ',',
    then begin
      if not eoln(input) then repeat
        read(com) until eoln(input);
        writeln(errmsg);
        errcnt := errcnt + 1;
        inv := true;
        {compute end line }
      else line1 := (l0*line1) + (ord(com)
        - ord('0'));
    end;
if not inv then begin
  if line1 = 0 then line1 := curline; {start line becomes
    current line}
  if first = true then line1 := line1;
  if (textsize < line1) or (textsize < line1)
    or (line1 < line1)
    then begin
      writeln(textsize:1, ' lines in file');
    end
  else begin
    if eoln(input) and (textsize > 0)
      then begin
        readln;
        write(']>');
        end;
    if textsize > 0 then
      replaceline(line1, line1)
    else writeln('0 lines in file');
  end;
end;
if eoln(input)
  then begin
    readln;
    write('F>');
    end;
curline := line1;
end; { readcom }

```

```
f  
*****  
PROCEDURE DISPCOM  
*****
```

**PURPOSE:** This procedure computes the start line, end line and pattern for the string search procedure (stringdiso). If the line number is defaulted, all lines in the user's file are searched. If the pattern string is defaulted, the procedure prompts the user. If an invalid line number is entered, an error message is returned. The procedure also computes the length of the pattern string.

```
VARIABLES:  
linest : start line  
linend : end line  
string : pattern to be matched  
stsize : length of the pattern  
*****
```

```
procedure dispcom;  
var  
com : char;  
linest, linend, stsize : integer;  
string : patstring;  
first, sta : boolean;  
inv : boolean;
```

```
begin  
linest := 0;  
inv := false;  
linend := 0;  
com := ' ';  
stsize := 0;  
first := true;  
sta := false;  
while not endn (input) and (com <> ct) do  
begin  
read(com);  
if not sta  
then if com = ct  
then begin  
sta := true;  
com := ' ';  
end  
else if not (com in ('0'..'9') + ('.'))
```

```

until eoln(input);
writeln(errmsg);
errcnt := errcnt + 1;
inv := true;
end
else if first {compute start line }
then if com = ',' then first := false
else linest := (10*linest) + (ord(com)-ord('0'))
else if com = ' ',
then begin
if not eoln(input) then repeat read(com)
until eoln(input);
writeln(errmsg);
errcnt := errcnt + 1;
inv := true;
end {compute end line}
else lineend := (10*lineend) +
(ord(com)-ord('0'))
else if com <> ct
then {compute pattern string and string length} begin
stsize := stsize + 1;
stringstsize := com;
end;
end;
if not inv then begin
if stsize = 0
then {if no string prompt user} begin
write('string?');
com := ' ';
if eoln(input) then readln;
while not eoln(input) and (com <> ct) do
begin
read(com);
if com <> ct
then begin
stsize := stsize + 1;
stringstsize := com;
end;
end;
end;
{check for line defaults and set to current line. If line is
greater than text size, set to last line of text}
if linest = 0
then begin
linest := 1;
lineend := textsize;
end;
else if first

```

```

then lineend := linest;
if lineend > textsize then lineend := textsize;
if linest > textsize then linest := textsize;
if (lineend < linest)
then begin
if not eoln(input) then repeat read(com)
until eoln(input);
writeln(errmsg);
errcnt := errcnt + 1;
end
else if textsize > 0 then begin
stringiso(linest,lineend,string,ssize);
errcnt := 0;
end
else writeln('0 lines in file');
end;
if eoln(input) then begin
readln;
write('E>');
end;
curline := lineend;
end ;
( dispcom )

```

```

(
*****
PROCEDURE STREPCOM
*****

```

PURPOSE: This procedure computes the start line, end line, pattern string, and new string to be inserted for the string replace procedure (stringrep). If the line number is defaulted, the current line is used. If no end line is specified, the start line is used. If the new string or pattern string is defaulted, the user is prompted. If an invalid line number is entered, an error message is returned.

VARIABLES:

```

line1 : startline
line2 : endline
oldstring : pattern string to be replaced
newstring : new string to be inserted
oldsize : pattern string length
newsize : new string length

```

```

*****

```

```

procedure strepcom;

```

```

var
  com : char;
  line1, line2, oldsize, newsize : integer;
  oldstring : natstring;
  first, oldstr, newstr : boolean;
  newstring : natstring;
  inv : boolean;

```

```

begin

```

```

  inv := false;
  line1 := 0;
  line2 := 0;
  com := ' ';
  oldsize := 0;
  newsize := 0;
  newstr := false;
  first := true;
  oldstr := false;

```

```

  while not endo (input) and (com <> ct) do
    begin
      read(com);

```

```

if not oldsta
then if com = cr (compute start, end line)
then begin
oldsta := true;
com := ' ';
end
else if not (com in ('0'..'9') + ['.','])
then begin
if not eoln(input) then repeat read(com)
until eoln(input);
writeln(errmsg);
errcnt := errcnt + 1;
inv := true;
end
else if first (compute start line)
then if com = ',' then first := false
else linest := (10*linest)+(ord(com)-ord('0'))
else if com = ','
then begin
if not eoln(input) then repeat read(com)
until eoln(input);
writeln(errmsg);
errcnt := errcnt + 1;
inv := true;
end (compute end line)
else lineend := (10*lineend) +
(ord(com)-ord('0'))
else if not newsta (input pattern string)
then if com <> cr
then begin
oldsize := oldsize + 1;
olstring[oldsize] := com;
end
else begin
newsta := true;
com := ' ';
end
else if com <> cr (input new string)
then begin
newsize := newsize + 1;
newstring[newsize] := com;
end;

```

end;

```

if not inv then begin
if oldsize = d (if no pattern prompt user)
then begin

```

```

com := ' ';
while not eoln(input) and (com <> ct) do
  begin
    read(com);
    if com <> ct
    then begin
      oldsize := oldsize + 1;
      oldstringoldsize := com;
    end;
  end;
end;

if newsize = 0      {if no new string prompt user}
then begin
  if eoln(input) then readln;
  write('newstring?');
  com := ' ';
  while not eoln(input) and (com <> ct) do
    begin
      read(com);
      if com <> ct
      then begin
        newsize := newsize + 1;
        newstringnewsize := com;
      end;
    end;
  end;
end;

{check for line defaults and set default values. If line number
is larger than text size, set line number to the last line
of text.}

if line = 0 then line := curline;
if first
then line := line;
if line > textsize then line := textsize;
if line > textsize then line := textsize;
if (line < line)
then begin
  if not eoln(input) then repeat read(com)
  until eoln(input);
  writeln(errmsg);
  errcnt := errcnt + 1;
end
else if textsize > 0 then begin
  stringrep(line,line,oldstring,
  newstring,oldsize,newsize);
  errcnt := 0;
end
end

```

```
else writeLn('0 lines in file');  
end;  
curline := lineid;  
if eoln(input) then begin  
  readln;  
  write('F>');  
end;  
end; { strepcom }
```



```

*****
PROCEDURE GETFILE
*****

```

**PURPOSE:** This procedure inputs the user's file name. The SLED directory is then searched for that file name. If the file name is found, the file is opened and textsize is set to the number of lines in the file. If the file name is not found, a new file is created and the file name is entered in the directory. The file <directory> is an explicit UNIX file which contains the current SLED directory. The file <tempd> is a scratch file which is created during execution as UNIX file tmpn.l. The contents of the directory are read to the scratch file during the directory search (less the file to be opened, if found). This scratch file is then read to the directory with the updated number of text lines for the currently opened file in procedure close.

**VARIABLES:** directory : SLED directory file. The format for the file is <text size> <file name>.  
tempd : scratch file  
fname : user's UNIX file name to be opened  
textsize : number of lines in the file

```

*****

```

```

procedure getfile;
var      ch : char;
         found : boolean;
         index, j, k, i : integer;

begin
  ch := ' ';
  textsize := 0;
  index := 0;

  (input the user file name)

  for i := 1 to namesize do
    found := ' ';
    i := 0;

```

```

while not eoln(input) and (ch <> ct) do
begin
  repeat read(ch) until (ch <> ' ') or eoln(input);
  if ch = ct
  then
    i := namesize + 1
  else begin
    i := i + 1;
    if i <= namesize then fname[i] := ch;
    end;
  end;
end;

```

(search for the user file fname in the directory)

```

if fname <> ' ' then begin
  reset(directory);
  found := false;
  i := 1;
  while not eof(directory) and not found do
  begin
    textsize := 0;

```

(if the file is found, compute textsize)

```

  repeat
    read(directory,ch);
    if ch in ['0'..'9'] then
      textsize := (10*textsize) + ord(ch)-ord('0');
  until ch = ' ';
  i := i + 1;
  while i <= namesize do
  begin
    read(directory,ch);
    if fname[i] <> ch
    then begin
      i := namesize + 2;
      index := index + 1;
    end
    else i := i + 1;
  end;
end;

```

```

if i = namesize + 1 then found := true
else if not eof(directory) then
  readln(directory);
end;
if i = namesize + 1
then begin

```

```

rewrite(tempd);
for i := 1 to index do
begin
    (write the contents of the directory, minus the
    file just opened to the scratch file)

    repeat
        read(directory,ch);
        write(tempd,ch);
    until eoln(directory);
    readln(directory);
    writeln(tempd);
    end;

    repeat
        read(directory,ch) until eoln(directory);
        readln(directory);
    while not eof(directory) do
        begin
            while not eoln(directory) do
                read(directory,ch);
                write(tempd,ch);
            end;
            readln(directory);
            writeln(tempd);
        end;
        k := 1;
        if textsize > 0 then
            (read the first 40 lines of text into the buffer)
            readbuf(k);
        end
    else begin
        writeln('-creating file ',fname,'-');
        textsize := 0;
        rewrite(tempd);
        reset(directory);
        while not eof(directory) do
            begin
                while not eoln(directory) do
                    read(directory,ch);
                    write(tempd,ch);
                end;
                readln(directory);
                writeln(tempd);
            end;
            k := k + 1;
        end;
        (write the first 40 lines of text into the buffer)
        readbuf(k);
    end
end;
rewriteln(mfile,fname);

```

```
(update the buffer status record and free list)

head.ptr := nil;
head.firstline := 0;
free := 1;
for j := 1 to bufsize - 1 do
    buff(j).nextline := j + 1;
buff(bufsize).nextline := nil;
end;

fileopen := true;
end
else begin
    writeln('-incorrect file name-');
end;

end ; ( getfile )
```

```

{
*****
PROCEDURE CLOSE
*****

PURPOSE: This procedure closes a previously opened text
file. The contents of the scratch file <temod>
are read into the SLED directory <directory>
The text size of the open file and the file
name are then entered as the last line of the
directory.

VARIABLES:
directory : SLED file directory
temod : scratch file
fname : currently open file name
textsize : number of lines in currently open file
digit : character representation of integer textsize

*****
procedure close;
var ch : char;
digit, i, j : integer;
number : array [1..5] of char;
begin
for j := 1 to 5 do
number[j] := ' ';
writeln('-closing file ',fname,'-');
j := 5;

{convert integer textsize to ASCII representation}
if textsize = 0 then number[j] := '0';
while textsize <> 0 do
begin
digit := textsize mod 10;
digit := digit + ord('0');
textsize := textsize div 10;
ch := chr(digit);
number[j] := ch;
j := j - 1;
end;

{insert text size into scratch file}
for i := 1 to 5 do

```

```

    if number[i] <> ' ' then
        write(tempd,number[i]);
    write(tempd,' ');

(insert file name into scratch file)

    for i := 1 to namesize do
        write(tempd,filename[i]);
    writeln(tempd);

(write scratch file to SLED directory)

    rewrite(directory);
    reset(tempd);
    while not eof(tempd) do
        begin
            while not eoln(tempd) do
                begin
                    read(tempd,ch);
                    write(directory,ch);
                end;
            readln(tempd);
            writeln(directory);
        end;
    writehuf;
end; { close }

```



```
end;
if not inv
  (if no file name, prompt user)
  then begin
    if eoln(input)
    then begin
      write('filename?>');
      readln;
      getfile;
    end
    else getfile;
    end;
  if eoln(input)
  then begin
    readln;
    write('t>');
  end;
  errcnt := 0;
end;
{ open }
```



```

(
*****
PROCEDURE QUIT
*****

```

PURPOSE: This procedure closes the currently open file if one exists by calling procedure close.

VARIABLES: inv : true if command is invalid

```

*****

```

```

procedure quit;
var ch : char;
    inv : boolean;
begin
ch := ' ';
inv := false;
while not eoln(input) and (ch <> ct) do
begin
read(ch);
if ch <> ct
then begin
if not eoln(input) then repeat read(ch) until
eoln(input);
write(errmsg);
errcnt := errcnt + 1;
inv := true;
end;
end;
if not inv and fileopen then begin
close;
fileopen := false;
errcnt := 0;
end;
if eoln(input) then begin
readln;
end;
end; { quit }

```

```

{
*****
PROCEDURE WRITEMENU
*****

```

PURPOSE: This procedure provides the SLED user with a description of the various commands available in SLED. It can be called by the user typing "M" or is automatically called if two invalid commands in a row are submitted. The procedure functions by utilizing a file "menu" which contains the SLED command summary. The file is reset, a character is read, then written etc. until eoln is reached. Then skip down to the next line of "menu" write the line just read and repeat the process until eof is reached.

A copy of the command menu is included in the program documentation.

```

*****

```

```

procedure writemenu;
begin
    reset(menu);
    while not eof(menu) do begin
        read(menu,ch);
        write(ch)
    end;
    readln(menu);
    writeln
end;
    if not cmderror then begin
        if not eoln(input) then
            repeat read(ch) until (ch = ct) or eoln(input);
            if eoln(input) then begin
                readln;
                write('F>');
            end;
        end
        also write('L>');
    end
end;
{ writemenu }

```

```

*****
PROCEDURE WRITEVERS
*****

```

PURPOSE: This procedure provides the SLED user with a description of the program version. In SLED it can be called by the user typing a "V". The procedure functions by utilizing a file "version" which contains the version documentation. The file is reset, a character is read then written etc. until eoln is reached. Then skip down to the next line of "version", write the line just read and repeat the process until eof is reached.

A copy of the version format is included in the program documentation.

```

*****
}

```

```

procedure writevers;

```

```

begin

```

```

    reset(version);
    while not eof(version) do begin
        while not eoln(version) do begin
            read(version,ch);
            write(ch)
        end;
        readln(version);
        writeln;
    end;
    if not eoln(input) then repeat
        read(ch) until (ch = ct) or eoln(input);
    if eoln(input) then begin
        readln;
        write(' ');
    end;
end;
end;

```

```

(
*****
PROCEDURE CHANGE_TERM
*****

```

PURPOSE: This procedure is used to change the value of the logical terminator from its optional value of \$. This is done by inputting the new value of the logical terminator from the console and assigning it to the variable "ct". At the same time, the 50 line buffer is scanned and the logical terminators within each line of the buffer are scanned and changed to the new value.

VARIABLES : Variables i and j are used as counters in repetitive statements. Subj is used as a temporary holder of the new logical terminator.

```

*****

```

```

procedure change_term;

```

```

var i:integer;
j:integer;
subj:char;

```

```

begin

```

```

writeln('ENTER THE CHARACTER DESIRED');
writeln('AS A LOGICAL MESSAGE TERMINATOR');
writeln('MUST BE A PRINTABLE CHARACTER');
writeln('LOGICAL TERMINATOR IS ',ct);
writeln;

```

```

readln;
write(' ');

```

```

for i := 1 to hufsize do
begin
for j := 1 to linesize do

```

```

begin
subj := buff(i).linestring(j);
if subj = ct then begin

```

```

buff(i).linestring(j) := letter

```

```
end;  
ct := letter;  
  writeln('LOGICAL TERMINATOR CHANGED TO ',ct);  
readln;  
write('E>');  
end; { changeterm }
```

```

{
*****
PROCEDURE KF_ERRROUTINE
*****

PURPOSE : This procedure is called whenever there are two consec-
----- utive input mistakes made by the operator. The command
          menu will be printed on the CRT screen to inform the
          user of the proper procedures for data display and
          input. The errorcount is reset to zero whenever this
          procedure is called ( errcnt is a global variable ).
          when a proper command is entered by the operator, the
          errorcount is also set to zero. This parameter can be changed
          to display the command menu less frequently by a small change
          in the main program.

*****
}

```

```

procedure errcountine;
begin
  writemenu;
  errcnt := 0;
end; { errcountine }

```

{\*\*\*\*\*  
MAIN PROGRAM  
\*\*\*\*\*}

PURPOSE: The main program is utilized to select the appropriate text editing procedure utilizing the inputs from the console. It also performs the initial editing of these inputs. The program will read the first 1 or 2 letters input to the console (depending on command input) and determine which procedure must be entered to execute the desired command. This is accomplished with a sequential scan of a series of if statements in which the first letter and if necessary the second letter of the command input to the console is checked against the authorized initial letter or letters of SLED commands. If the initial editing is successfully completed in one of the if statements, the procedure associated with that if statement is entered. The remainder of the command is edited in the called procedure. If the sequential scan nets through the last if statement and no match is found with a valid command, the following is done:

1. Error message printed
2. Increment error counter
3. Check value of the error counter;  
if large enough enter procedure to write command menu
4. Check if more commands follow; if not, read a line
5. Return to statement 10 in the main program and read the next command.

In each if statement associated with commands which would have follow-on parameters after the initial letter(s), the status of the error count is checked to determine the success of editing in the procedure and if necessary the error message or menu is printed. After every return from a procedure, the program goes to statement 10 and enters the next command except for the quit command which causes the program to terminate.

VARIABLES : The following global variables are used in the main program :

- errcnt : count of user generated input errors
- cmderror : boolean used to check for proper input commands
- fileopen : boolean check to ensure that a file is opened before allowing the procedures to operate
- letter : character input of the user

```
*****
```

```
begin
  ct := 's';
  fileopen := false;
  writeln;
  writeln;
  writeln('SLID');
  writeln;
  writeln('NEW TYPE "M" FOR COMMAND MENU');
  writeln('DO "V" FOR SYSTEM VERSION');
  writeln;
  errcnt := 0;
  cmderror := true;
  write('E>');

```

```
10: read(letter);
```

```

if (letter = 'l') then begin if fileopen then displayline
else begin writeln('-no file open-');
      readln;
      write('F>');
      end;
      if errcnt > 1 then errroutine;
      goto 10;

if (letter = 's') then begin if fileopen then screenline
else begin writeln('-no file open-');
      readln;
      write('F>');
      end;
      if errcnt > 1 then errroutine;

```



```

writemenu;
cmderror := true;

errcnt := 0;
goto 10

end;

if letter = 'V' then begin writevers;

errcnt := 0;
goto 10

end;

if letter = 'O' then begin open;

errcnt := 0;
goto 10

end;

if letter = 'Q' then begin quit; goto 100;
end;
if letter = 'A' then
begin
read(letter);
if (letter = 'L') then begin if fileopen then appendcom
else begin
writeln('-no file open-');
readln;
write('E>');
end;
if errcnt > 1 then errroutine;
goto 10
end

else begin
errcnt := errcnt + 1;
writeln(errmsg);
if errcnt > 1 then errroutine
else write('E>');
readln;
end;

errcnt := 0;
goto 10
end

end;
if letter = 'S' then
begin
read(letter);
if (letter = 'S') then begin if fileopen then dispcom
else begin
writeln('-no file open-');
readln;
write('E>');
end;
if errcnt > 1 then errroutine;
goto 10
end
end
end

```

```

else begin
  errcnt := errcnt + 1;
  writeln(errmsa);
  if errcnt > 1 then errroutine
  else write('F>');
  readln;
end;

if letter = 'C' then
  begin
    read(letter);
    if (letter = 'I') then begin chanqeterm;
      errcnt := 0;
      goto 10
    end
  else begin
    errcnt := errcnt + 1;
    writeln(errmsa);
    if errcnt > 1 then errroutine
    else write('E>');
    readln;
  end;
end;

if letter = 'W' then
  begin
    read(letter);
    if (letter = 'L') then begin if fileopen then replcom
    else begin
      writeln('-no file open-');
      readln;
      write('F>');
      end;
    if (letter = 'S') then begin if fileopen then streacom
    else begin
      writeln('-no file open');
      readln;
      write('F>');
      end;
    if errcnt > 1 then errroutine;
      goto 10
    end;
  end;
end;

if errcnt > 1 then errroutine;
  goto 10
end;

if errcnt > 1 then errroutine;
  goto 10
end;
else begin
  errcnt := errcnt + 1;

```

```

else write('E>');
readln;

                                goto 10

                                end

errcnt := errcnt + 1;
writeLn(ErrMssg);
if errcnt > 1 then erroutline
  else write('E>');
if letter <> ' ' then readln;

                                goto 10;

100: writeLn(' ');
end. { main program }

```

```

{***** END SLED *****}

```

NOT STANDARD PASCAL USES IN THIS VERSION OF SLED  
Obtained from the UC Berkeley PASCAL translator ( pi -s option )

- s 244 - Two argument forms of reset and rewrite are non-standard
- s 297 - Two argument forms of reset and rewrite are non-standard
- s 1920 - Two argument forms of reset and rewrite are non-standard
- s 172 - Two argument forms of reset and rewrite are non-standard

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